2002 WOOD RIVER WETLAND ANNUAL MONITORING REPORT

Restored Wood River Channel

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Restoration Project Time Line

This project is designed to restore approximately 3,000 acres of wetland habitat and 2.5 miles of river channel. The Bureau of Land Management's (BLM) project goals include improved water quality and quantity, and improved habitat for two endangered fish species, as well as other wildlife. Secondary goals are to provide for public recreation, environmental education and research.

Phase 1 components:

a) Construction of 2 miles of levee and associated water control structures.
b) Creation of two ponds in the northeast corner of the property.
c) Replacement of an existing pump station.
d) Design of a new drainage system to emulate original stream courses across the property.
e) Reconstruction of 0.5 mile of existing levee.

Ducks Unlimited completed construction of the new pump station in September 1996. In July of 1997, Ducks Unlimited completed two miles of levee construction (approximately 65,000 cubic yards of material), installed four new water control structures (full-round risers with screw gates and flashboards, and created two ponds (approximately 20 acres total). In 2001 Ducks Unlimited in partnership with Rocky Mountain Elk Foundation contributed approximately $20,000 in engineering and contract labor to improve nesting and brood rearing habitat for waterfowl and shorebirds. The U.S. Fish and Wildlife Service contributed labor and equipment to create 6 miles of meandering drainage channels and repair 0.5 mile of existing levee in August of 1997.

Phase 2 components:

a) Reconstruction of a levee for 1.8 miles with 60,000 cubic yards of material across the middle of the project area.
b) Construction of two settling ponds in front of the two pump stations to serve as final treatment for water to be pumped from the property.
c) Installation of three water control structures associated with this middle levee and ponds were completed in February 1998.
d) Installation of four water control structures by June 1998.

Phase 3 components:

Oregon Trout is the lead partner providing technical and financial support to restore the lower 1.8 miles of the Wood River to its historic form and function, from the confluence of Crooked Creek south to the dike road bridge. Construction of this project began in September of 1997, with the stockpiling of materials and creation of approximately two acres of wetland habitat. Approximately 40% of the construction work was completed in 1998. The remainder of this

work was completed in 1999. This phase of the project is designed to improve refugial habitats for the early life stages of endangered suckers, fish passage, and instream habitat for trout, and provide a wider flood plain with improved riparian and wetland habitat for waterfowl and neotropical migrant birds.

The restoration of a 3,300-foot section of historic channel south of the dike road bridge was completed in January of 2001. The design of this portion of the project was modified, during implementation, to include two hydraulic grade control structures. These structures were constructed by placing fill material in two side channels downstream of the Dike Road Bridge. Additional rock was added to maintain one of these structures in January of 2002. The restoration of this delta stream channel should provide improved habitat for early life stages of fish, as well as improving water quality in the northeast portion of Agency Lake.

Phase 4 components:

The final phase of the Wood River Wetland restoration project will be to develop a more sinuous and diverse interface along Sevenmile Canal. This would involve a two-mile reach of existing levee. This phase of the project will provide improved refugial habitat for larval and juvenile fish, as well as improved nesting and brood-rearing habitat for waterfowl and Neotropical migrant birds. Potential partners include Ducks Unlimited, Oregon Trout, Water for Life, U.S. Fish and Wildlife Service, Trout Unlimited, and the Bureau of Reclamation. Studies are underway to examine the feasibility of this portion of the project.

Partners

We would like to express our thanks to a diverse group of partners, committed to restoring the Klamath Basin Ecosystem. To date, Federal partners are Klamath Basin Working Group, Bureau of Land Management, U.S. Fish and Wildlife Service (Klamath Basin Refuges), Klamath Basin Ecosystem Restoration Office, National Fish and Wildlife Foundation, Winema National Forest, U.S. Forest Service Redwood Sciences Lab, the Bureau of Reclamation, U.S. Geological Survey, and U.S. Environmental Protection Agency.

Non federal partners to date are American Lands Conservancy, Ducks Unlimited, Oregon Trout, Oregon Watershed Enhancement Board, Oregon Department of Transportation, Oregon Department of Environmental Quality, The Klamath Tribes, The Nature Conservancy, Jim Root Ranch, The Rocky Mountain Elk Foundation, The Usual Suspects, Oregon Department of Fish and Wildlife, Oregon State University Extension Service, Klamath Basin Audubon Society, Oregon Institute of Technology, Henley High School, Lost River High School, Tulelake High School, Butte Valley High School, Chiloquin Elementary School, and Oregon Wetlands Joint Venture.

More information about this project is available by contacting Wedge Watkins at the Klamath Falls Resource Area (541) 885-4110, or email wwatkins@or.blm.gov.

Waterfowl

Historic Management

From 1985 through 1994, this property was managed as irrigated pastureland for beef cattle production. Under this management objective, the mode of operation was as follows. Water that had accumulated on the property over the winter would be pumped off beginning in February or March. Pumping would continue until the property was without surface water except in the drainage canals. This condition was usually achieved by approximately May 1. Cattle were trucked into the ranch beginning in April and turned out on the north half of the property. Approximately 1,300 cow/calf pairs grazed the property through November with some variation in these dates due to weather. Irrigation of the property was usually conducted during June, July, August and September, with typical use being 3,000-6,000 acre ft.. Under this management scenario, open water was available from December –April or limited the drainage canals. Spring and fall forage for migrating geese was abundant. Grasses, sedges and weeds dominated vegetation on the property.

Recent Management

1995 was the first year that the property was not managed for cattle grazing. Water that accumulated during the winter remained on the property throughout the growing season. Irrigation water was added to the property in September, prior to the waterfowl hunting season. The response to this new management from waterfowl was dramatic, with total waterfowl numbers in excess of 100,000. The property was drained to facilitate construction work during the period of 1996-1998. Management from 1999-2003 has followed the general scenario of: reduce discharge pumping from the wetland (improve water quality), reduce summer irrigation of the wetland (increase water quantity available), irrigate a limited amount in September and October (wildlife habitat/recreation).

Field Observations in 2000

An early and relatively mild spring set the stage for an excellent waterfowl production year. Waterfowl broods observed in August indicate that brood production doubled for the second consecutive year (see Tables 1, and figure A). The diversity of habitats available for waterfowl and shorebirds is good, and should continue to increase over the next several years. A nesting colony of white-faced ibis (approximately 100 nesting pair) was observed for the second year. Other birds observed nesting include black-necked stilts, common snipe, Sandhill cranes, Virginia rail, and black terns. The overall number of species using the property in 2000 remained similar to past years. The overall peak numbers of waterfowl increased slightly in the spring (19,280 in 99 vs. 20,900 in 2000) and decreased in the fall (22,200 in 99 vs. 14,030 in 2000). Fall waterfowl numbers were lower throughout the basin in 2000, and the majority of the property was frozen over from November 20th through December. These peak numbers were

less than in 1998 and significantly less than 1995. Waterfowl habitat, around Agency Lake, has greatly improved, as the result of other restoration efforts (Tulana Farms, Agency Lake Ranch). This improved habitat has also changed waterfowl distribution.

Table 1. Brood Count Data 8/2000

Species	Total young counted	Number of broods	Avg. young per brood
Cinnamon Teal	1339	173	7.7
Gadwall	1212	136	8.9
Mallard	308	37	8.3
Shoveler	4	27	6.7
Eared Grebe	117	73	1.6
Pied Bill Grebe	18	10	1.8
Ringneck	8	2	4
Greenwing teal	70	14	5
Widgeon	26	5	5.2
Ruddy Duck	23	5	4.6
Pintail	81	10	8.1
Scaup/Redhead	8	3	2.6
Coot	252	65	3.9
Total	**3,466**	**560**	**6.2**

Field Observations in 2001

A mild and dry winter of 2000-2001 resulted in lower than normal water levels at Wood River Wetland. Because of the water crisis experienced throughout the basin during the summer of 2001, a decision was made to manage the wetland by mimicking the natural hydrograph (drought). This resulted in most of the wetland (2500 acres) being dry by August 1, 2001. As expected waterfowl brood numbers were low (Table2 and figure A), reflecting the limited available habitat. Production for other water birds (grebes /coots/terns/black necked stilts) was also lower than in past years. White-faced ibis, production appeared to be slightly less than in 2000. The property was flooded again in early October, with water levels increasing throughout the winter months.

Table 2. Brood Count Data 8/2001			
Species	**Total young counted**	**Number of broods**	**Avg. young per brood**
Cinnamon Teal	270	56	4.8
Gadwall	247	42	5.9
Mallard	35	9	3.9
Widgeon	32	4	8
Shoveler	6	1	6
Pintail	15	3	5
Ruddy Duck	1	1	1
Ringneck	6	1	6
Wood Duck	4	1	4
Bufflehead	4	1	4
Total	**620**	**119**	**5.2**
Two adult white fronted geese, and two adult hooded mergansers were also observed during the survey			

Field Observations in 2002

Field observations during 2002 were delayed due to a combination personnel being involved with wildfires and other priorities. This resulted in brood counts being conducted the third week of August instead of the first week of August. After a couple of hours of observation, it was apparent that most of the broods were already capable of flight. Since broods capable of flight were not counted in previous years, continuing with the brood count was not practical. It was obvious to our monitoring team that large numbers of ducks and water birds were produced in 2002. A conservative estimate would be 3,000 young (see figure A). Waterfowl numbers peaked in September with over 128,000 birds present during the fall migration (table 3).

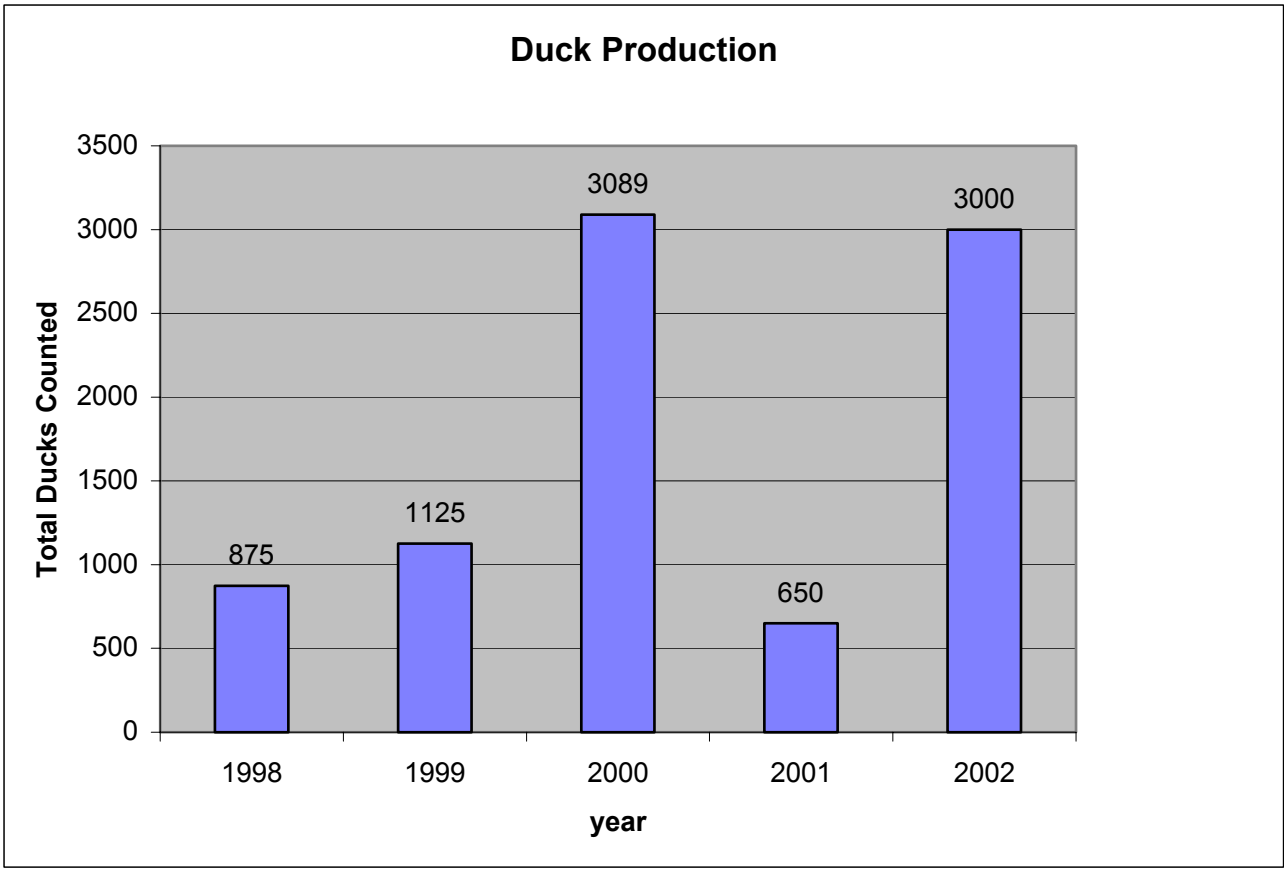


Figure A

The long-term management strategy for Wood River Wetland includes having longer periods of inundation. In general the north half of the property will be managed to provide seasonal wetland habitat and the south half of the property will be managed to provide a more permanent marsh/open water habitat. While no far-reaching conclusions can be drawn from this limited data, the ability of both vegetation and waterfowl to respond to changes in water management on the property has already been demonstrated. Based on the data displayed in Figure A, BLM expects that waterfowl production will continue to increase as cover increases. We expect that spring and fall peak use of the property by migrating waterfowl will remain in the 25,000 - 80,000 range. The U.S. Fish and Wildlife Service has conducted Periodic waterfowl census flights over the property during the past nine years (except May-August) by. The results of those flights are displayed in Table 3.

Table 3. Total Waterfowl (Ducks and Geese) - Aerial Surveys					
Date	**Total**	**Date**	**Total**	**Date**	**Total**
03/19/93	400	10/02/97	29,100	04/21/00	8,400
04/04/93	20,100	10/16/97	2,500	09/05/00	7,710
09/03/93	150	01/07/98	830	0915/00	12,460
01/09/94	1,040	02/26/98	3,520	09/27/00	5,090
02/25/94	16,300	03/18/98	24,020	10/10/00	15,830
09/02/94	6,950	04/20/98	13,100	10/25/00	540
03/02/95	7,300	09/02/98	3,790	11/07/00	2,960
04/14/95	20,100	09/30/98	24,400	11/22/00	0 (frozen)
09/07/95	35,160	10/12/98	5,300	01/13/01	0 (frozen)
09/19/95	104,700	10/28/98	10,130	02/14/01	0 (frozen)
10/04/95	54,900	11/16/98	16,900	03/08/01	34,700
10/25/95	4,180	12/11/98	1,560	03/25/01	31,700
11/01/95	5,210	01/04/99	470	09/06/01	4600
11/22/95	21,800	03/01/99	21,630	09/21/01	18,760
01/22/96	470	03/15/99	19,280	10/24/01	500
02/05/96	980	09/07/99	3,240	01/04/02	120(frozen)
03/03/96	3,400	09/22/99	22,200	01/30/02	0 (frozen)
03/21/96	32,370	10/05/99	0	02/22/02	4,100
09/03/96	13,800	10/20/99	4,660	03/13/02	50,440
09/19/96	8,500	11/02/99	3,400	04/17/02	3,220
10/03/96	14,400	11/15/99	8,200	09/03/02	125,380
10/16/96	6,400	12/04/99	1,160	10/03/02	37,300
10/30/96	4,500	12/04/99	1,160	10/16/02	13,960
11/06/96	4,500	01/07/00	300	10/30/02	450
01/06/97	0(frozen)	02/04/00	700	11/14/02	5,400
03/03/97	39,010	02/18/00	18,710	12/04/02	20
09/09/97	4,800	03/07/00	22,600	1/5/03	920

Neotropical Migratory Bird and Yellow Rail Surveys

Introduction

Since 1997, the Bureau of Land Management, Pacific Southwest Research Station of the U.S. Forest Service and the Klamath Bird Observatory, have collected baseline data and monitored neotropical migratory bird populations within the Wood River Wetland. Data is collected at the "Monitoring Avian Productivity and Survivorship" (MAPS) site. The MAPS site at Wood River

is one of many in the Upper Klamath Basin and surrounding area, which includes several along the west side of Upper Klamath Lake. The goal of the collective sampling at several sites is to evaluate the reproductive success and population health of Neotropical migratory birds and to maintain a long term monitoring effort for tracking population trends.

The Nature Conservancy has conducted surveys for yellow rails on the property where restoration work has been completed. In addition, mid-winter bald eagle counts have been conducted by BLM personnel on the property for the past four years.

Methods

Sampling at the MAPS site at Wood River is intended to collect data on reproductive success, use of the area during fall migration, and overall trend for Neotropical migratory birds. The methods involved for monitoring under this study include mist netting, point counts associated with the mist net site during the breeding season and area search at the mist net site during fall migration. The site is sampled from mid-May through the end of October.

Yellow rail surveys are conducted at night in preferred habitat types to locate territorial males. Males are captured and banded where it is feasible to do so. Nest searches take place during the day in suitable habitat within likely breeding territories.

Results and Discussion

Neotropical Migratory Birds - The total number of bird species captured through mist netting at Wood River during the 2002 breeding season was 42. The six most common of those captured during the breeding season, in order of abundance, were the song sparrow, red-winged blackbird, yellow warbler, tree swallow, American robin, and Wilson's warbler (Table 4). The total number of bird species captured during the fall migration season was 22. The six most common of those captured during the fall migration, in order of abundance, were the song sparrow, hermit warbler, yellow-rumped warbler, yellow warbler, golden-crowned sparrow, and Wilson's warbler (Table 4). The song sparrow and yellow warbler have been detected annually during the breeding season since surveys began in 1997. The song sparrow is a year-round resident. The yellow-rumped warbler utilizes the area only during migration and nest in coniferous forests.

Table 4. Relative abundance (number of individuals captured per 1000 net hours between) of bird species captured during the breeding (BRD= May-August) and migration (MIG= September-October) seasons between 1997 and 2001, and during 2002 at the Wood River Constant Effort Mist Netting Stations.

CODE	SPECIES	CONSERVATION STATUS*	1997-2001 BRD	1997-2001 MIG	2002 BRD	2002 MIG
SOSP	Song Sparrow		244.69	43.82	267.84	48.08
YRWA	Yellow-rumped Warbler		12.08	208.58	2.50	36.06
YWAR	Yellow Warbler	East, Valley	65.46	11.68	87.61	24.04
AMRO	American Robin		91.56	4.67	70.09	8.01
RWBL	Red-winged Blackbird		74.03	0.58	90.11	0.00
WIWA	Wilson's Warbler	Westside	24.55	4.09	65.08	16.03
HETH	Hermit Thrush	Cascade	0.00	52.00	0.00	0.00
BHCO	Brown-headed Cowbird		51.04	0.00	47.56	0.00
AMGO	American Goldfinch		25.72	0.00	65.08	0.00
OCWA	Orange-cr. Warbler	Westside	11.30	33.30	25.03	16.03
TRES	Tree Swallow	Valley	7.40	0.00	72.59	0.00
WIFL	Willow Flycatcher	East, Rocky, Valley	15.59	4.09	40.05	12.02
MAWR	Marsh Wren		26.50	16.94	12.52	4.01
BHGR	Black-headed Grosbeak		23.77	0.00	25.03	0.00
COYE	Common Yellowthroat		10.13	8.76	15.02	12.02
BCCH	Black-capped Chick.		7.79	13.44	12.52	12.02
HEWA	Hermit Warbler	Westside	0.78	0.00	0.00	44.07
DOWO	Downy Woodpecker	Valley	7.40	5.26	27.54	0.00
HOWR	House Wren	Valleys	2.73	2.34	25.03	8.01
WEWP	Western Wood-Pewee	Valley	16.75	1.17	20.03	0.00
RCKI	Ruby-crowned Kinglet		0.00	18.11	0.00	0.00
MGWA	MacGilliv. Warbler	Rocky	8.18	8.18	17.52	0.00
GCSP	Golden-cr. Sparrow		0.00	11.68	0.00	20.03
FOSP	Fox Sparrow		0.39	18.11	0.00	12.02
LISP	Lincoln's Sparrow	Westside	2.34	18.70	2.50	4.01
MOCH	Mountain Chickadee		1.17	9.35	5.01	8.01
PUFI	Purple Finch	Valley	10.13	1.17	10.01	0.00
VATH	Varied Thrush	Rocky, Westside	0.00	15.77	0.00	4.01
NAWA	Nashville Warbler	Cascade, Valley	6.62	0.58	12.52	0.00
WETA	Western Tanager		3.90	1.75	10.01	0.00
BUOR	Bullock's Oriole	East, Valley	7.79	0.00	0.00	0.00
DEJU	Dark-eyed Junco		0.00	7.60	0.00	0.00
STJA	Steller's Jay		0.00	2.34	0.00	12.02
SWTH	Swainson's Thrush	Valley	4.68	0.58	5.01	4.01
SPTO	Spotted Towhee		0.39	5.26	0.00	8.01
WCSP	White-crowned Sparrow		0.00	6.43	0.00	0.00
DUFL	Dusky Flycatcher		1.56	0.00	7.51	0.00
HOSP	House Sparrow		0.00	0.00	0.00	4.01

SSHA	Sharp-shinned Hawk		1.17	4.09	2.50	0.00
RBSA	Red-br. Sapsucker		1.17	1.75	0.00	4.01
WAVI	Warbling Vireo	Rocky	1.95	1.75	2.50	0.00
TRBL	Tricolored Blackbird		2.73	0.00	0.00	0.00
BRCR	Brown Creeper	Cascade, Westside	0.00	2.92	2.50	0.00
NOFL	Northern Flicker		1.17	1.75	2.50	0.00
GCKI	Golden-cr. Kinglet		0.00	1.75	0.00	0.00
WTSP	White-th. Sparrow		0.00	1.75	0.00	0.00
CEDW	Cedar Waxwing		0.78	0.00	2.50	0.00
EUST	European Starling		0.78	0.00	2.50	0.00
LAZB	Lazuli Bunting	East	0.39	0.00	2.50	0.00
BBMA	Black-billed Magpie		0.00	0.00	2.50	0.00
PYNU	Pygmy Nuthatch	Cascade, ODFW	1.17	0.00	0.00	0.00
YHBL	Yellow-headed Black.		1.17	0.00	0.00	0.00
BUSH	Bushtit	Valley	0.39	0.58	0.00	0.00
WEFL	Western Flycatcher		0.39	0.58	0.00	0.00
CAVI	Cassin's Vireo		0.78	0.00	0.00	0.00
YBCH	Yellow-breasted Chat	East, Valley, ODFW	0.78	0.00	0.00	0.00
LEOW	Long-eared Owl		0.00	0.58	0.00	0.00
PSFL	Pacific-sl. Flycatch.	Westside	0.00	0.58	0.00	0.00
SAVS	Savannah Sparrow		0.00	0.58	0.00	0.00
WIWR	Winter Wren	Westside	0.00	0.58	0.00	0.00
AMRE	American Redstart		0.39	0.00	0.00	0.00
BAWW	Black and White Warb.		0.39	0.00	0.00	0.00
BRBL	Brewer's Blackbird		0.39	0.00	0.00	0.00
GTTO	Green-tailed Towhee		0.39	0.00	0.00	0.00
HAFL	Hammond's Flycatcher	Westside	0.39	0.00	0.00	0.00
LEGO	Lesser Goldfinch		0.39	0.00	0.00	0.00
NSWO	Northern Saw-whet Owl		0.39	0.00	0.00	0.00
PISI	Pine Siskin		0.39	0.00	0.00	0.00
RNSA	Red-naped Sapsucker	East, Cascade, Rocky	0.39	0.00	0.00	0.00

* Conservation Status: Cascade, Columbia, Rocky, Valleys, Westside = Partners In Flight Focal Species as identified by East-Slope Cascade, Columbia Plateau, Northern Rocky Mountains, Lowlands and Valleys, and Westside Coniferous Forest Landbird Conservation Plans for Oregon and Washington (Altman 1999, Altman 2000a-c, Altman and Holmes 2000); ODFW = Oregon Department of Fish and Game sensitive, threatened or endangered species (ORDW 1997, ODFW 2000)

A total of 186 bird species were documented at Wood River as of November 2002 (Table 5). This list includes species detected during the MAPS study. Seven new species not previously documented at Wood River were found during the summer and fall of 2002, they include: Bewick's Wren, Black-throated Gray Warbler, Brewer's Sparrow, House Sparrow, Gray Jay, Red Crossbill, and Rufous Hummingbird.

Table 5 List of All Bird Species (Total = 186)
Birds documented at the Wood River Wetland as of November 2002. (*Species not previously documented at Wood River, which were detected during 2002.)

American avocet
American bittern
American coot
American crow
American goldfinch
American kestrel
American redstart
American robin
American white pelican
American widgeon
Bald eagle
Barn owl
Barn swallow
Bewick's Wren*
Belted kingfisher
Black-&-white warbler
Black-billed magpie
Black-capped chickadee
Black-crowned night heron
Black-headed grosbeak
Black-necked stilt
Black tern
Black-throated gray warbler*
Blue-winged teal
Bonaparte's gull
Brant
Brewer's blackbird
Brewer's sparrow*
Brown creeper
Brown-headed cowbird
Bufflehead
Bullock's oriole
Bushtit
California gull
California quail
Canada goose
Canvasback
Caspian tern
Cassin's vireo
Cedar waxwing
Chestnut-backed chickadee
Chipping sparrow
Cinnamon teal
Clark's grebe
Cliff swallow
Common barn owl
Common loon
Common merganser
Common nighthawk
Common raven
Common snipe
Common yellowthroat
Cooper's hawk
Dark-eyed junco
Double-crested cormorant
Downy woodpecker
Dusky flycatcher
Eared grebe
European starling
Evening grosbeak
Ferruginous hawk
Forster's tern
Fox sparrow
Franklin's gull
Gadwall
Golden-crowned kinglet
Golden-crowned sparrow
Goldeneye
Grasshopper sparrow
Gray jay*
Great blue heron
Great egret
Great horned owl
Great-tailed grackle
Greater scaup
Greater white-fronted goose
Greater yellowlegs
Green-backed heron
Green-tailed towhee
Green-winged teal
Hammonds' flycatcher
Hairy woodpecker
Hermit thrush
Hermit warbler
Hooded merganser
Horned grebe
Horned lark
House finch
House sparrow*
House wren
Killdeer
Lazuli bunting
Least flycatcher
Least sandpiper
Lesser goldfinch
Lesser scaup
Lesser yellowlegs
Lincoln's sparrow
Loggerhead shrike
Long-billed dowitcher
Long-eared owl
MacGillivray's warbler
Mallard
Marsh Wren
Merlin
Mountain bluebird
Mountain chickadee
Mourning dove
Nashville warbler
Northern flicker
Northern harrier
Northern pintail
Northern rough-winged swallow
Northern saw-whet owl
Northern screech owl
Northern shoveler
Northern shrike
Olive-sided flycatcher
Orange-crowned warbler Osprey
Peeps
Peregrine falcon
Pied-billed grebe
Pine siskin
Prairie falcon
Purple finch
Pygmy nuthatch
Red-breasted nuthatch
Red-breasted sapsucker
Red crossbill*
Redhead
Red-naped sapsucker
Red-tailed hawk
Red-winged blackbird
Ring-billed gull
Ring-necked duck
Ross' goose
Ruby-crowned kinglet
Ruddy duck
Rufous hummingbird*
Sandhill crane
Savannah sparrow
Say's phoebe
Sharp-shinned hawk
Short-billed dowitcher
Short-eared owl
Snow bunting
Snow goose
Snowy egret
Song sparrow
Sora
Spotted sandpiper
Spotted towhee
Stellar's jay
Swainson's thrush
Townsend's solitaire
Tree swallow
Tri-colored blackbird
Tundra swan
Turkey vulture
Varied thrush
Violet-green swallow
Virginia rail
Warbling vireo
Western flycatcher
Western grebe
Western kingbird
Western meadowlark
Western sandpiper
Western tanager
Western wood-pewee
White-breasted nuthatch
White-crowned sparrow (gambelii)
White-throated sparrow
White-faced ibis
Willow flycatcher
Willet
Wilson's phalarope
Wilson's warbler
Winter wren
Wood duck
Yellow-breasted chat
Yellow-headed blackbird
Yellow rail
Yellow-rumped warbler
Audubon's warbler
Myrtle warbler
Yellow warbler

Future Monitoring

The MAPS study of Neotropical migratory birds by the KBO and RSL will continue as funding is available. The surveys of yellow rails by The Nature Conservancy ended in 2002, due to BLM budget reductions in 2003. Bald eagle mid-winter counts will continue indefinitely. Monitoring of landbirds by BLM using point counts will resume once there is a minimum of three years of vegetative growth subsequent to the completion of the restoration. The restoration was completed in the late fall of 1999 in the areas where baseline monitoring stations were established for landbirds. In the spring of 2003, the degree of vegetation changes and general bird presence will be evaluated to determine if it is appropriate to initiate monitoring.

Yellow Rail

A total of ten surveys of the Wood River Wetland were conducted in 2000. Two rails were detected on May 6 and three were detected on the May 15 visit. One of these birds was banded. No other birds were heard calling on the remainder of the site visits. This compares to 6 rails heard in 1998 and 7 rails heard in 1999. Lower water levels were observed in 1999 and 2000 as well as a shorter duration of flooding. There were also different observers in 2000 than in previous years. This information was taken from an annual report on yellow rail monitoring that is produced by The Nature Conservancy in cooperation with U.S. Fish and Wildlife Service, Winema National Forest, Oregon Department of Fish and Wildlife and BLM. Copies of this report can be obtained by contacting the Klamath Falls Resource Area of BLM. The survey for yellow rails was repeated in cooperation with The Nature Conservancy in the 2001 and 2002 field seasons. Yellow rails continue to use the property along with several other areas in the Wood River valley. The overall population (Wood River valley) appears to be small but relatively stable.

Bald Eagle

1998-2002

Mid-winter bald eagle counts were conducted during 1998 and 1999. Mid-winter counts are conducted annually on a nationwide basis during target dates in January. The route at Wood River consists of a 6-mile route around the perimeter of the property. In 1998, five immature bald eagles and one adult bald eagle were observed along the route. In 1999, two adult bald eagles and two immature eagles were documented. In 2000, three immature bald eagles and two adult bald eagles were observed along the route. In 2001, four adult bald eagles and two immature bald eagles were observed. In 2002, two mature bald eagles and two immature bald eagles were observed. Bald eagles also have been frequently observed hunting at Wood River during the spring and summer months.

Vegetation

Data were collected from 30 vegetation monitoring plots on the Wood River Wetland property during 2002. Twenty of the plots were originally established in 1995, and 9 plots were first established in 1996 to complete the planned plot design for vegetation monitoring. One new plot was established in 1999 within the riparian wetland created by filling a portion of the dredged Wood River channel. The objective is to monitor vegetation change over time in response to wetland restoration management actions. Since the changes in the plant community that may occur as a result of restoration actions is unknown, a minimal area could not be determined for the size of the releves. Therefore, a standard releve size of 100 m^2 (5.64 m radius circular plots) for grassland-type plant communities was used. Coordinates for each plot were determined in 1996 using a GPS. Details of the sampling methods are included in the 1995 monitoring report.

A preliminary tabulation of the data for selected species from 1997, 1999, and 2002 shows that the changes in water management have resulted in some changes in the vegetation, as reflected in changes in individual species distribution and cover/abundance (Table 6). Reed canary grass (*Phalaris arundinacea*) decreased in frequency (per cent of plots in which it occurred) during this time period from 59% in 1997, to 50% in 1999, to only 20% in 2002. Similarly, quack grass (*Elytrigia repens*), an exotic pasture grass listed as noxious by the Oregon state weed board, also decreased in frequency from 28% in 1997, to 10% in 1999, to only 3% in 2002 (which represents occurrence in only one plot). These changes indicate that conditions at the Wood River Wetland are less conducive to the persistence of species adapted to seasonal and/or disturbed, marginal wetlands.

Several emergent obligate wetland species increased in frequency, but then decreased in frequency in 2002. The frequency of spike rush (*Eleocharis macrostachya*) was 79% in 1997 and 87% in 1999, but declined to 63% in 2002. Similarly, Baltic rush (*Juncus balticus*) was 55% in 1997 and 62% in 1999, but declined to 40% in 2002. Although hard stem bulrush (*Scirpus acutus*) was 14% in 1997, 20% in 1999 and remained at 20% in 2002, the distribution of plots in which it occurred changed between 1999 and 2002.

Two other obligate wetland species, cattail (*Typha latifolia*) and giant burreed (*Sparganium eurycarpum*), were not found in any plots in 1997, but occurred in six plots (20% frequency) and three plots (10% frequency) respectively in 1999. Cattail declined in frequency in 2002 with a 7% frequency, and although giant bur-reed increased in frequency in 2002 to 13% frequency, the distribution of plots in which it occurred changed. This pattern of increasing then decreasing frequency, and/or changes in distribution among plots, seems to result from changes in water management. Since 1999, more water has been maintained on the property for a longer period of time, especially on the southern portion of the property. Only four plots were noted as having standing water 2 – 6 inches deep on the southern portion in 1999, while eight plots were noted as aquatic or open water in the southern portion in 2002, some with depths of 1 – 3

feet. This is probably too deep for some of these emergent wetland plant species, and species adapted to these deeper water conditions have not had time to establish as yet. Several submerged and floating aquatic species were found in the vegetation sample plots for the first time during the 1999 sampling. Coontail (*Ceratophyllum demersum*) was found in eight plots (28% frequency), Canadian waterweed (*Elodea canadensis*) was found in two plots (7% frequency), and common duckweed (*Lemna minor*) was found in 11 plots (38% frequency). However in 2002, coontail declined to only 3% frequency, and Canadian waterweed did not occur in any plots. Common duckweed increased on overall frequency to 53%, but declined in frequency in the southern portion of the property from 73% to 47% while increasing in frequency from 13% to 60% on the northern portion of the property. These changes also seem to be related to the longer, deeper hydroperiod, especially on the southern portion. For example, in the eight plots noted as aquatic or open water in 2002, coontail disappeared from 6, was reduced in abundance in one, and was never noted in the other. These changes also reflect the dynamic state of change of the vegetation in response to changing environmental conditions.

A closer examination of changes in the data between 1999 and 2002 shows this dynamic state of change of the vegetation (Table 6). Reed canary grass, considered weedy and invasive by some, increased in cover/abundance in 1 plot, decreased in 5 plots, came into 0 plots, dropped out of 8 plots, but remained unchanged in 0 plots. Similarly, spike rush, a common emergent, obligate wetland species, increased in cover/abundance in 2 plots, decreased 5 plots, came into 1 plot, dropped out of 8 plots, and remained about the same in 11 plots. Therefore, future monitoring should detect more changes in the vegetation, with a general trend towards the establishment of a plant community typical of a functioning wetland.

Table 6. VEGETATION PLOTS CHANGE 1999 – 2002
And Summary of Changes 1997-2002

	Weedy		Emergent						Aquatic			Alga
	PHAR	ELRE	CAUR	ELMA	JUBA	SCAC	TYLA	SPEU	CEDE	LEMI	ELCA	APFL
Increase	1	0	0	2	1	3	1	1	0	0	0	0
Decrease	5	0	5	5	8	0	0	0	1	5	0	0
Added	0	0	1	1	1	2	1	2	0	10	0	2
Removed	8	2	1	8	6	2	5	1	7	6	3	6
Same	0	1	2	11	2	1	0	1	0	1	0	0
97 Plots	17	8	7	23	16	4	0	0	0	0	0	0
99 Plots	15	3	8	26	18	6	6	3	8	12	3	6
02 Plots	6	1	8	19	12	6	2	4	1	16	0	2
97 Freq (%)	59	28	24	79	55	14	0	0	0	0	0	0
99 Freq (%)	50	10	27	87	60	20	20	10	27	40	10	20
02 Freq (%)	20	3	27	63	40	20	7	13	3	53	0	7

PHAR: Reed canary grass
ELRE: Quackgrass
CAUR: Beaked sedge
ELMA: Spike rush
JUBA: Baltic rush
SCAC: Bulrush
TYLA: Cattail
SPEU: Burreed
CEDE: Coontail
LEMI: Duckweed
ELCA: Canadian waterweed
APFL: Alga

Table 7 lists the plant species that have been compiled from surveys conducted from 1995-2002, on Wood River Wetland.

Table 7. Wood River Wetland Plant Species List

Botanical Name	Common Name
Achillea millefolium	yarrow
Agoseris herterophylla	annual agoseris
Agrostis exarata	spike bentgrass
Agrostis exarata var. monolepis	bentgrass
Agrostis idahoensis	Idaho bentgrass
Agrostis interrupta	bentgrass
Agrostis stolonifera	bentgrass
Alisma plantago-aquatica	water plantain
Alopecurus aequalis	shortawn foxtail
Alopecurus pratensis	meadow foxtail
Amsinckia intermedia	fireweed fiddleneck
Anthemis cotula	mayweed
Aphanizomenon flos-aquae	nostoc
Artemisia douglasii	Douglas' sagebrush
Atriplex patula var. hastata	spear oracle
Atriplex triangularis	spearscale
Beckmannia syzignachne	American sloughgrass
Bidens cernua	nodding beggars-tick
Bromus tectorum	cheat grass
Calamagrostis stricta ssp. inexpansa	reed grass
Capsella bursa-pastoris	shepard's purse
Cardaria draba	hoary cress
Carex aquatilis	water sedge
Carex athrostachya	slenderbeaked sedge
Carex lasiocarpa	slender sedge
Carex nebraskensis	Nebraska sedge
Carex simulata	short beaked sedge
Carex sitchensis	Sitka sedge
Carex utriculata	beaked sedge
Centaurea solstitialis	yellow starthistle
Ceratophyllum demersum	coontail
Chenopodium album	white goosefoot
Chenopodium berlandieri	pitseed goosefoot
Chenopodium foliosum	goosefoot
Cicuta douglasii	water hemlock
Cirsium arvense	Canada thistle
Cirsium scariosum	elk thistle
Cirsium vulgare	bull thistle
Collomia linearis	narrow-leaf collomia

Danthonia unispicata	one-spike oatgrass
Descurainia pinnatum	tansy mustard
Deschampsia cespitosa	tufted hairgrass
Deschampsia danthonioides	annual hairgrass
Elatine rubella	waterwort
Eleocharis asicularis	needle spikerush
Eleocharis macrostachya	spikerush
Elodea canadensis	Canadian waterweed
Elymus cinereus	giant wildrye
Elytrigia repens (Agropyron repens)	quack grass
Epilobium angustifolium	fireweed
Epilobium ciliatum var. ciliatum	willowherb
Epilobium brachycarpum	tall annual willowherb
Equisetum arvense	field horsetail
Erigeron philadelphicus	Philadelphia fleabane
Erigeron sp.	
Eryngium articulatum	coyote thistle
Erysimum cheiranthoides	wormseed mustard
Fragaria vesca	strawberry
Galium aparine	bedstraw
Galium boreale	northern bedstraw
Galium trifidum	small bedstraw
Glyceria borealis	mannagrass
Glyceria elata	tall mannagrass
Gnaphalium palustre	cudweed
Gratiola ebracteata	hedge-hyssop
Helenium autumnale var. montanum	sneezeweed
Heracleum lanatum	cow parsnip
Hippuris vulgaris	common mare's tail
Hordeum brachyantherum	meadow barley
Hordeum jubatum	foxtail barley
Juncus balticus	baltic rush
Juncus bufonis	toad rush
Juncus ensifolius	dagger leaf rush
Juncus nevadensis	sierra rush
Kochia scoparia	red belvedere
Lactuca serriola	prickley lettuce
Lemna minor	duckweed
Lepidium campestre	English pepperweed
Lepidium perfoliatum	clasping pepperweed
Limosella aquatica	mudwort
Lupinus lepidus	prairie lupine
Lupinus polyphyllus	bigleaf lupine
Lythrum portula	greenweed
Madia glomerata	mountain tarweed
Matricaria matricarioides	pineapple weed
Melilotus officionalis	sweet clover

Mentha arvensis	mint
Mimulus guttatus	monkey flower
Muhlenbergia asperifolia	scratchgrass
Muhlenbergia filiformus	pull-up muhly
Muhlenbergia richardsonis	mat muhly
Myosotis laxa	forget-me-not, stickseed
Myosurus aristatus	mouse-tail
Nemophila pedunculata	nemophila
Nuphar polysepalum	wocus, spatterdock
Onopordum acanthium	Scotch thistle
Phalaris arundinacea	canary reed-grass
Plagiobothrys cognatus	popcorn flower
Plantago major	plantain
Poa palustris	bluegrass
Poa pratensis	Kentucky bluegrass
Polygonum amphibium	water smartweed
Polygonum aviculare	common knotweed
Polygonum douglasii	Douglas' knotweed
Polygonum persicaria	knotweed
Polypogon monspeliensis	rabbitfoot grass
Populus trichocarpa	black cottonwood
Potamogeton crispus	crispate-leaved pondweed
Potamogeton foliosus	leafy pondweed
Potamogeton natans	floating-leaved pondweed
Potentilla anserina	common silverweed
Potentilla norvegica	cinquefoil
Ranunculus cymbalaria	shore buttercup
Ranunculus sceleratus	buttercup
Ribes cereum	squaw currant
Ribes inerme	white-stemmed gooseberry
Ribes lacustre	swamp currant
Rorippa curvilsiliqua	watercress
Rorippa obtusa	cress
Rorippa palustrus	cress
Rumex crispus	curly dock
Rumex maritimus	golden dock
Sagittaria latifolia	arrowhead, wapato
Salix lucida ssp. lasiandra	shining willow or Pacific willow
Scirpus acutus	hardstem bulrush
Scutellaria galericulata	marsh skullcap
Senecio hydrophiloides	sweet marsh ragwort
Sisymbrium altissimum	tumble mustard
Solanum dulcamara	bitter nightshade
Sonchus asper ssp. asper	yellow sow thistle
Sparganium eurycarpum	giant bur-reed
Stachys rigida	hedge nettle

Taraxicum officinale	dandylion
Thlaspi arvense	fan-weed
Tragopogon dubius	salsify
Trifolium microdon	clover
Trifolium hybridum	alsike clover
Trifolium repens	white clover
Typha latifolia	common cattail
Urtica diocia	stinging nettle
Verbascum thapsis	common mullein
Veronica americana	American brooklime
Veronica peregrina ssp. xalapensis	purslane speedwell

Riparian Resources

Photo Points

During 2002 the photo points were not monitored. Since most of the active restoration work has been completed, the visual changes in the vegetation are not as evident as in past years. The photos will be retaken on a new schedule of every 5 years. The next scheduled year is 2006.

The 12 riparian photo points are located approximately 1000 meters apart along the Seven Mile dike and the Wood River (see Figure B). At each point four photos are taken, one in each of the four cardinal directions (North, South, East, and West) using a compass to determine the direction. The photos are taken during the middle to end of June.

A map of the photo points and copies of the photos are located in the Wood River Photo Points binder at the Klamath Falls Field Office.

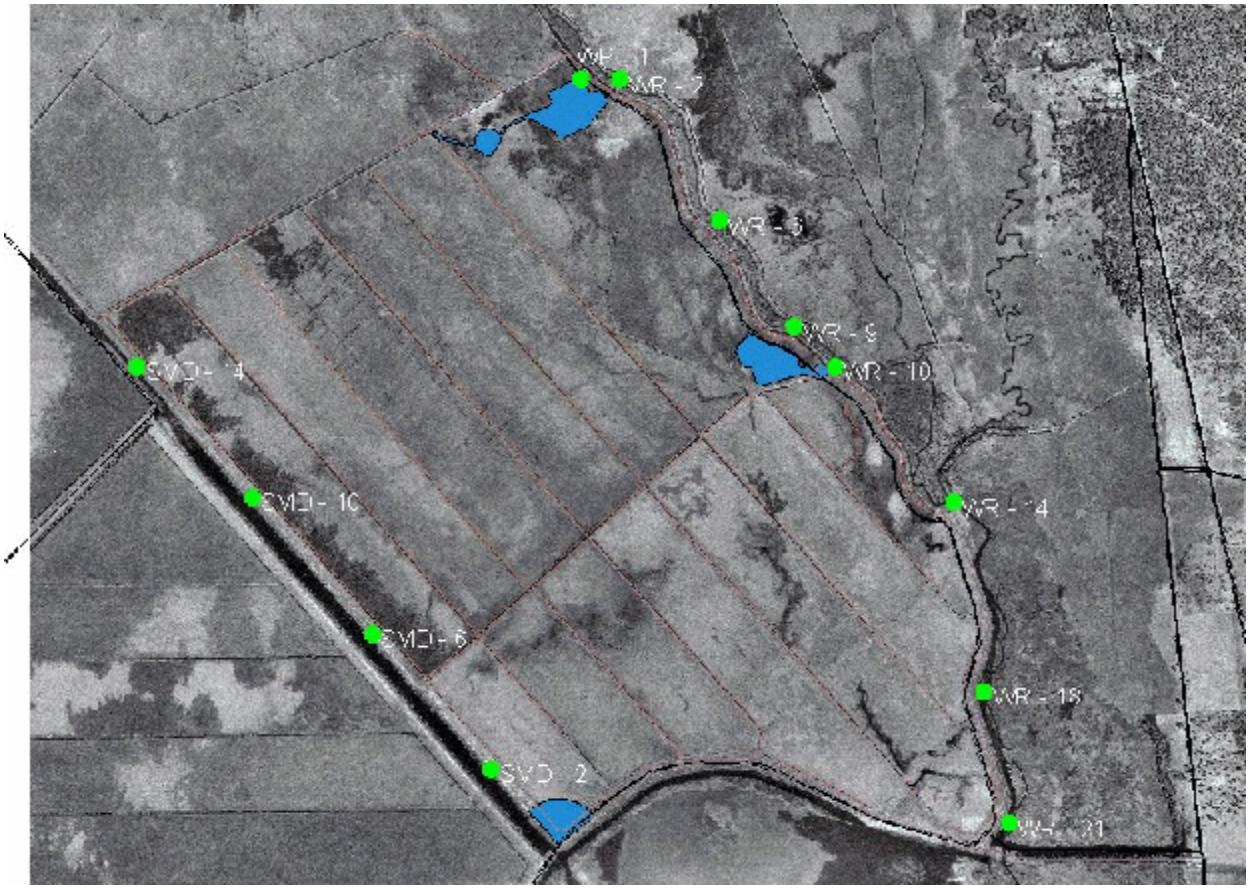


Figure B. Riparian Vegetation monitoring photo points

Water Quality

Wood River channel temperature

Methods:
Water temperature data loggers were deployed at two stations in 1997 (North Boundary Station and Bottom of Project Station. A third water temperature station was added in 1998 below the confluence of Crooked Creek at the top of the channel construction reach (map 1). No data from the temperature probe at the north boundary station was obtained in 2002 because the probe malfunctioned. The objective of these data loggers was to accurately measure how the narrowing and deepening of the Wood River affects the rate of stream warming through the project reach. Calibration and deployment of temperature loggers followed methods described in "*Water Quality Monitoring Technical Guide Book, Oregon Plan for Salmon and Watersheds, 1999*".

Results:
Channel surface area in the study area was reduced from 36 acres to 16 acres between 1998 and 2000 (Figure C). The range of flows during the summer of 1998 and 2002 does not overlap (figure D). Average flows in 2002 were less than half the values observed in

1998 (table 6). Average daily air temperature at the Chiloquin weather station was 4.6 degrees Fahrenheit higher in 2002 than in 1998. However, note that in early July air temperature was higher in 2000 and flow was lower, yet warming (^{a}T) was still approximately 2 degrees lower after restoration work. Since ambient air temp is higher than water temperature (table 8), the relationship of discharge to stream warming should be negative (Betchta et al 1987). It can be assumed that lower discharge would have caused increased warming potential in 2002.

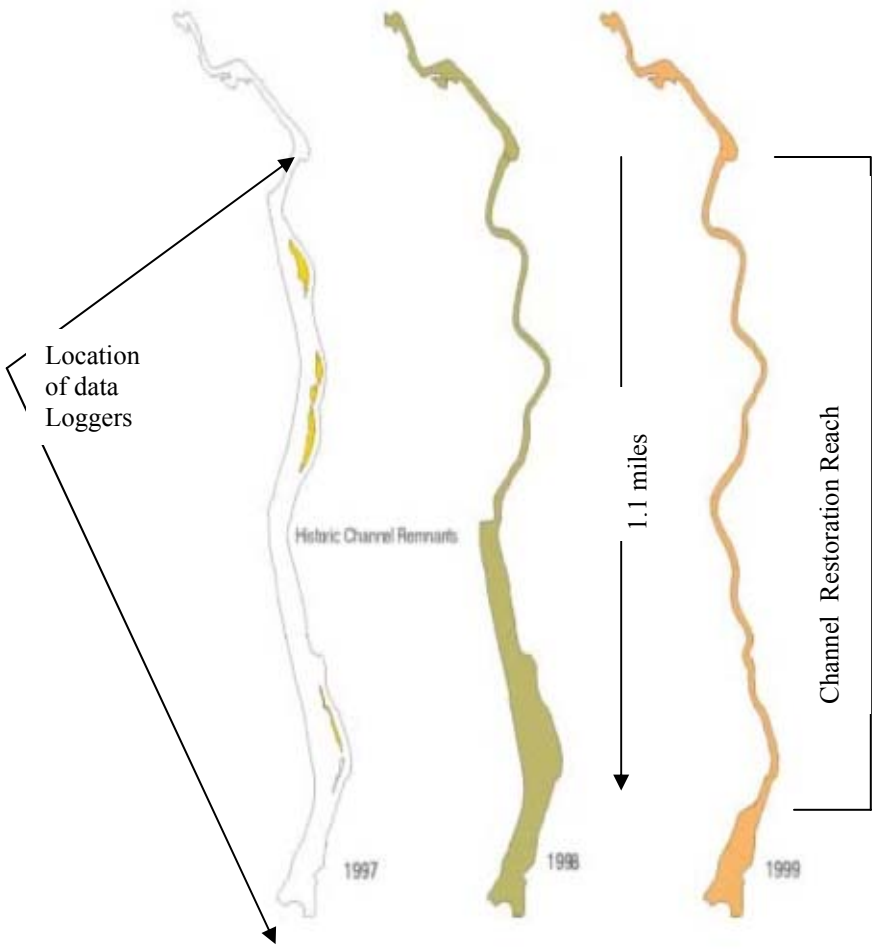
Table 8. Average Values for June 15 -Aug 30

	1998	2002	Difference
Maximum Air Temp (Degrees F)	87.5	82.9	-4.6
Discharge (CFS)	272	124	-148.2
Daily Mean Temp (F) -upstream	56.3	59.1	2.8
Daily Mean Temp (F)-downstream	59.5	57.4	-2.1
Water Surface Area (Acres)	36	16	20
Average Stream Warming (June-Aug)	3.2	1.6	-1.6

To account for the differences in air temperature and starting water temperature between years, linear regression curves for both years were compared. The relationship of stream warming (^{a}T) to upstream water temperature and maximum daily air temperature is strong for both years (R^2 = .85, 1998 and $R^{2=}$ .64, 2002). Discharge information adds little to the power of the relationships (R^2 <.2).. Figure E shows that predicted warming in 2002 is significantly less than predicted by the 1998 regression curve. The difference in the regression equations ($^{a}T_{98}$- $^{a}T_{02}$) (figure F) is likely a result of the change in surface area of the channel exposed to solar radiation and/or increase in mean water velocity due to channel restoration (figure. C). These results suggest that channel narrowing has reduced the potential for stream warming by approximately 1 to 4 degrees Fahrenheit for the range of summer conditions experienced in 2002.

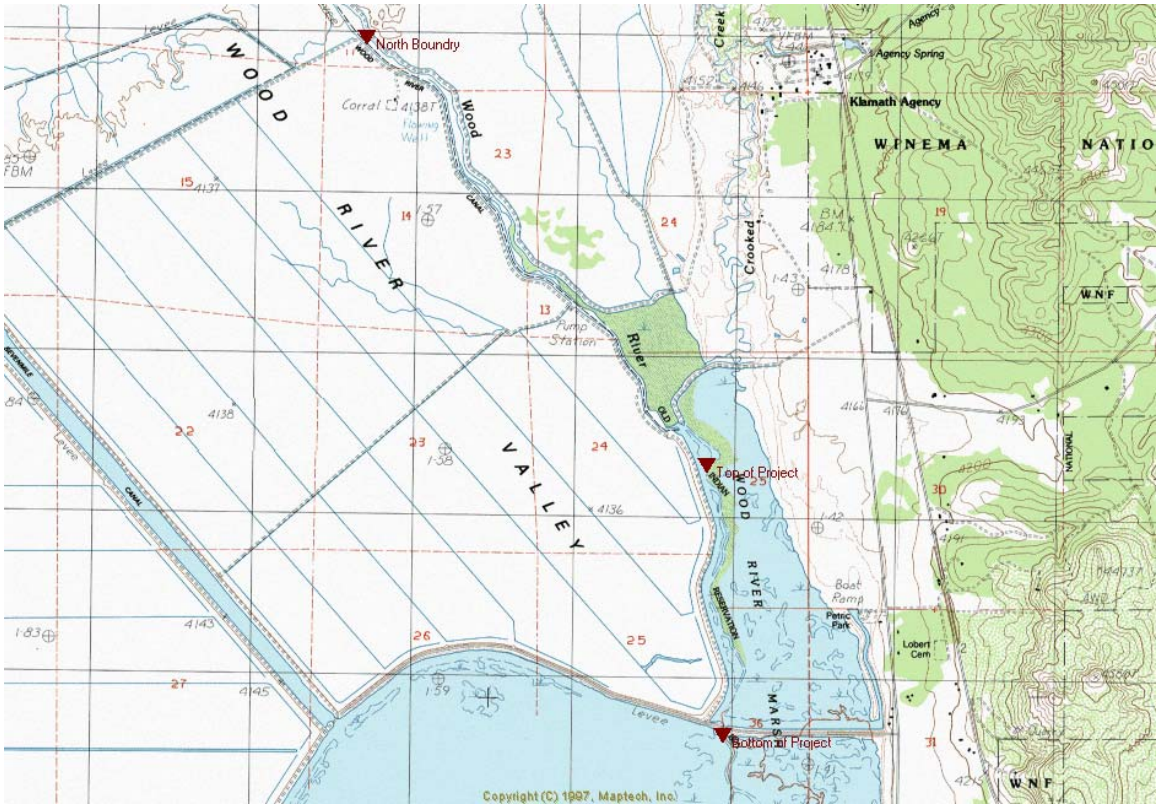
Temperature Monitoring 2003:

Temperature monitoring in the Wood River Channel will be repeated using the same methods as in previous years. 2003 data will be used to further validate results.



	1997	1998 (October)	1999 (August)
AREA (sq.ft.)	1568154	1172112	714115
AREA (acres)	36.00	26.91	16.39
Mean width (ft)	238.6	154.5	84.7

Figure C. Schematic diagram showing change in channel surface area before an after restoration work.



Map 1. Location of temperature data loggers

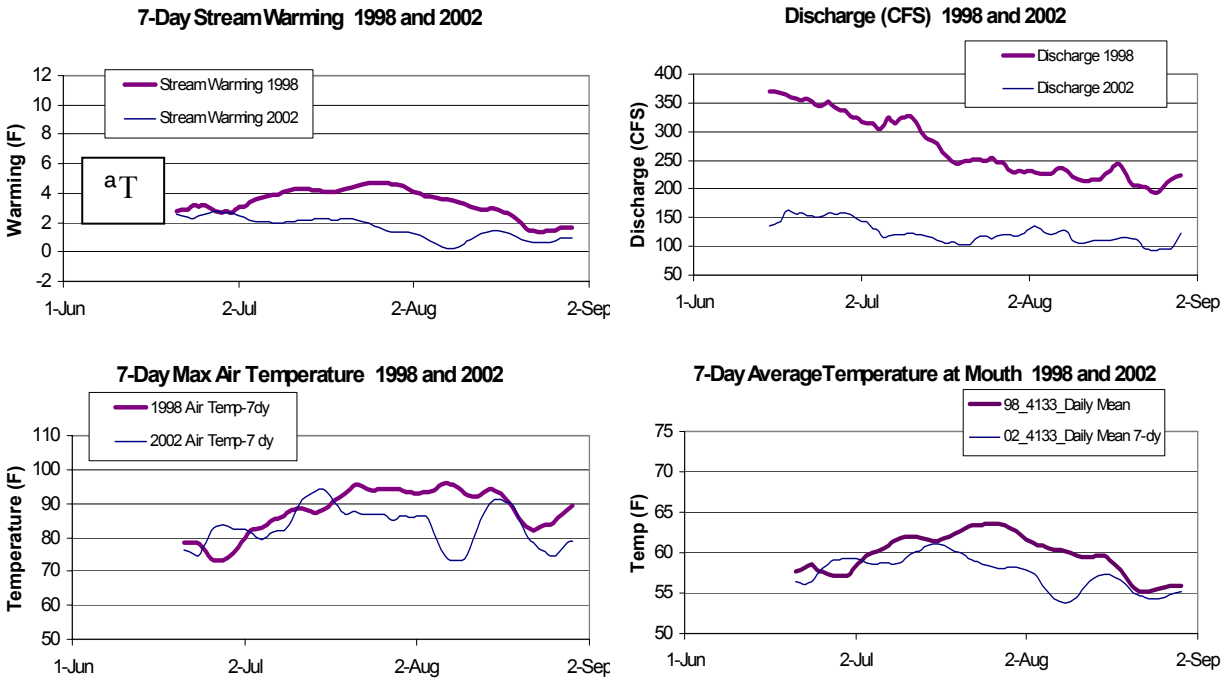


Figure D. Stream warming, discharge, air temperature, and water temperature at project bottom before (1998) and after (2002) restoration work.

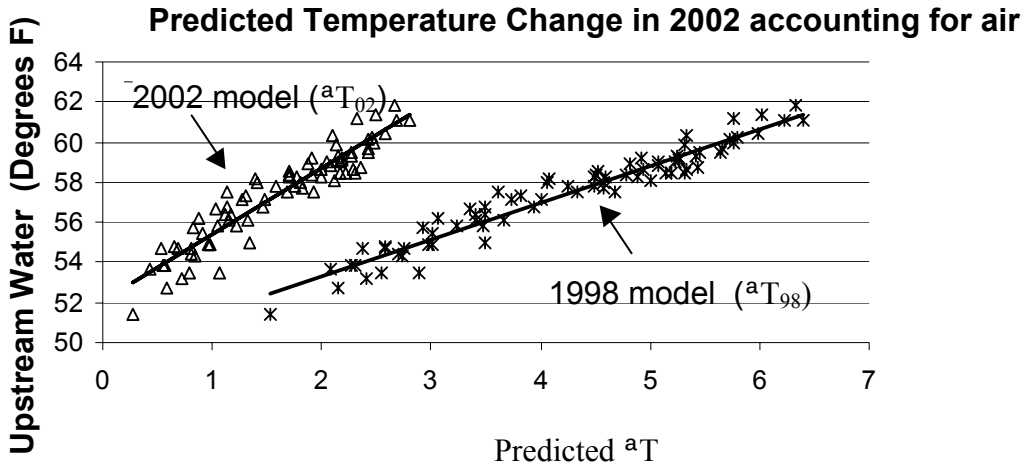


Figure E. 1998 and 2002 regression curves plotted with mean air and water temperature data collected in 2002. 2002 model: $^aT_{02}$ =16.79+(-0.042*Max air)+(0.381*H_2O Temp), Adj R^2=.64; 1998 model: $^aT_{98}$ =29.06+(-0.056air)+(0.66* H_2O Temp), Adj R^2=.85

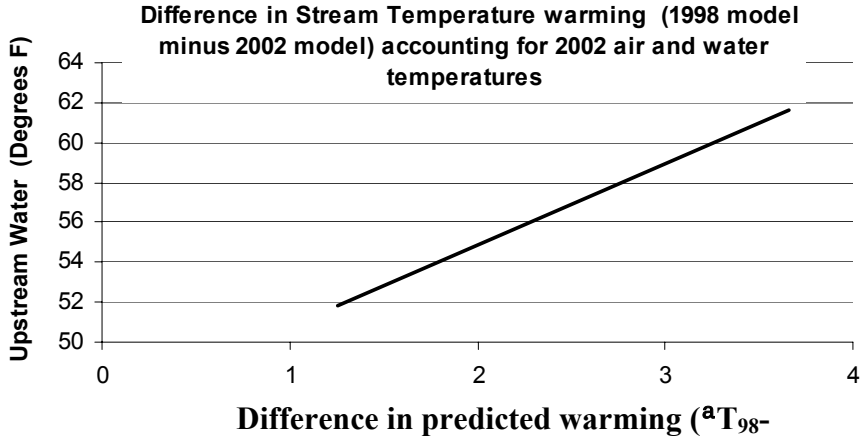


Figure F. Difference in warming predicted by the two models in figure 3 ($^aT_{98}$- $^aT_{02}$).

Wood River Delta Water Quality

Methods: No additional data was collected in 2002 in the Wood River Delta. Starting in summer, 2000, water temperature data loggers were deployed at eight stations in Agency Lake in an array around the existing Wood River Delta to assess effects of channel outlet relocation on water quality. Additionally, hydrolab water quality samples were taken at weekly intervals at the temperature monitoring stations during August at the eight stations between 10 and 12 AM. Surface and bottom profiles were obtained. Hydrolab data included temperature, dissolved oxygen, pH, and conductivity. Temperature data from continuous data recorders has not been analyzed and will be presented in future reports.

Results: Depths of initial deployment ranged from 2.7 meters to 1.7 meters.
2000 results: Oxygen depletion was apparent at sites 1,2,5,6 and 7 but never reached below 5.5 mg/l (less than 4 mg/l is considered lethal for most fish species). However, measurements were taken well after the time of day that photosynthesis would be expected to have increased O_2 levels. Measurements of pH, reached levels above 9.0 (max 9.6 at wrd_7) at all sites except wrd_3 (nearest to the mouth of the Wood River). However, bottom pH exceeded 9.0 only at sites 5,6,7, and 8.

2001 results: When data from all eight stations are combined, pH and dissolved oxygen were generally lower in 2001 than in 2003, whereas temperature remained relatively similar between years. Climate and lake level differences between years make it difficult to draw conclusions about how channel relocation has affected water quality within Agency Lake.

Monitoring 2003: The methods and timing used in 2003, will be identical to the previous efforts to allow for comparison between years. This will allow for an assessment of effects of channel relocation on water quality at the selected locations. Of particular interest will be the effect of channel relocation on site wrd_8, which is approximately 1/4 mile south of the delta near the east shore. Hydrolab water quality measurements will also be taken at weekly intervals in July since this is usually the time of year that water quality conditions are most severe and limit available fish habitat.

Nutrient Loading

No new information for 2002 regarding nutrient concentrations and loading is available. The information presented is identical to that which was reported in the 2001 monitoring report. Additional nutrient data collected under contract with the Bureau of Reclamation in the Wood River/ and Sevenmile Canal area will be added to this report when that data becomes available.

Interior Wetland
At two sites in the Wood River Wetland, the concentrations of total phosphorous (TP) and total Kjeldahl nitrogen (TKN) were measured from 1993 to 1995 (Snyder and

Morace, 1997) and from 1999 to 2000 (Rykbost and Charlton, 2001). A total of 44 samples were taken at the pumps that discharge into Sevenmile Canal and the Wood River.

At both sites, the concentration of TP was lower in 1999/2000 than it was in 1993/1995. TKN concentrations decreased slightly at the Sevenmile site but increased at the Wood River site. Because of these decreased concentrations, and because much less water is pumped from the wetland under its current management program, the total load of TP and TKN delivered to Agency Lake has decreased. Delivery of nutrients to Sevenmile Canal has been eliminated (with the possible exception of minor seepage), and delivery of TP and TKN to the Wood River has been reduced by 82% and 73% respectively. (See Table 9 and Figures G and H below.)

					Nutrient Concentration (mg/l)		Load Delivered to Agency Lake (lbs)	
Sample Location	Sample Years	Number of Samples	Average Pump Rate (cfs)	Duration of Pumping	Total Phosphorous	Total Kjeldahl Nitrogen	Total Phosphorous Load	Total Kjeldahl Nitrogen
Sevenmile Canal	1993-1995	6	20	60	0.93	3.3	1241.1	4403.9
	1999-2000	22	N/A	0	0.49	3.0	0.0	0.0
Wood River	1993-1995	6	20	60	0.98	2.7	1307.8	3603.2
	1999-2000	10	25	10	0.86	3.5	239.1	973.1

Table 9: Nutrient Concentrations and Loading at Two Pump Sites in the Wood River Wetland

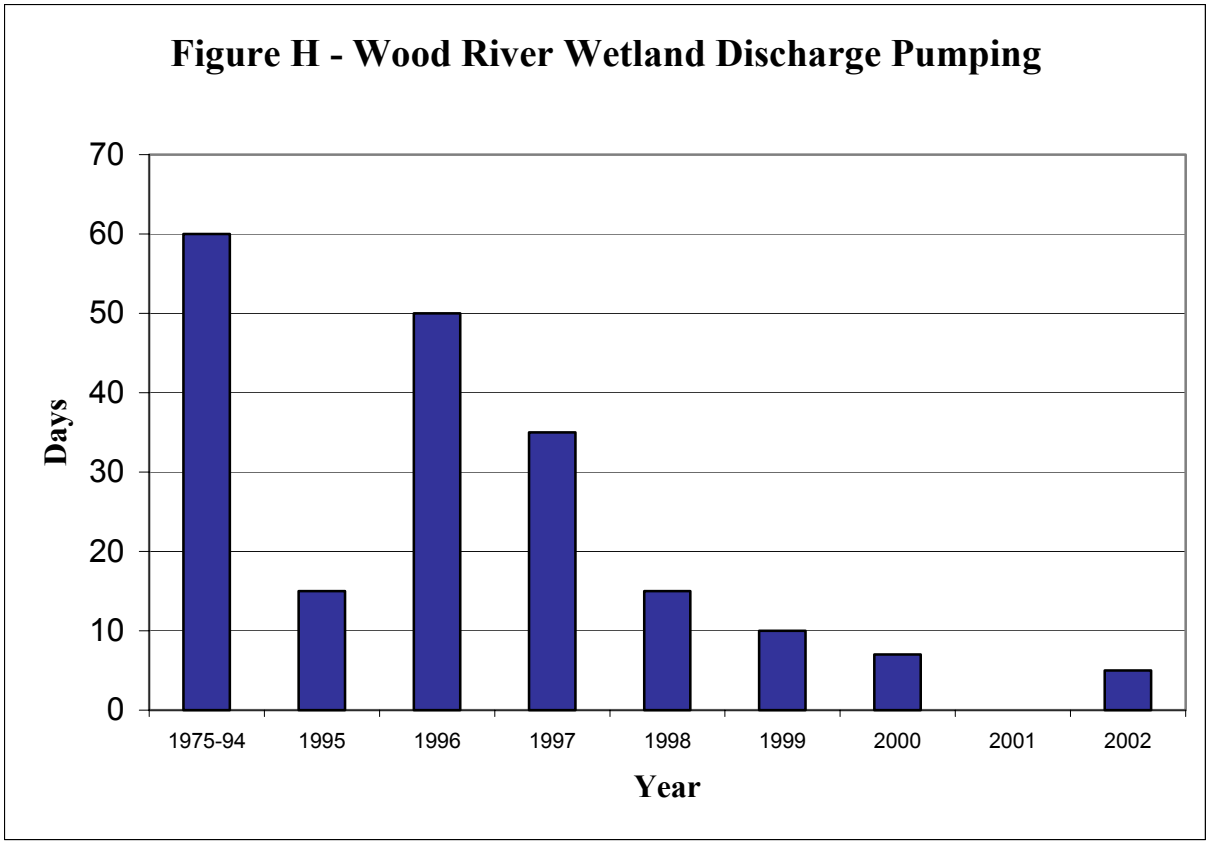


Figure H - Wood River Wetland Discharge Pumping
70
60
50
40
30
20
10
0
Days
1975-94
1995
1996
1997
1998
1999
2000
2001
2002
Year

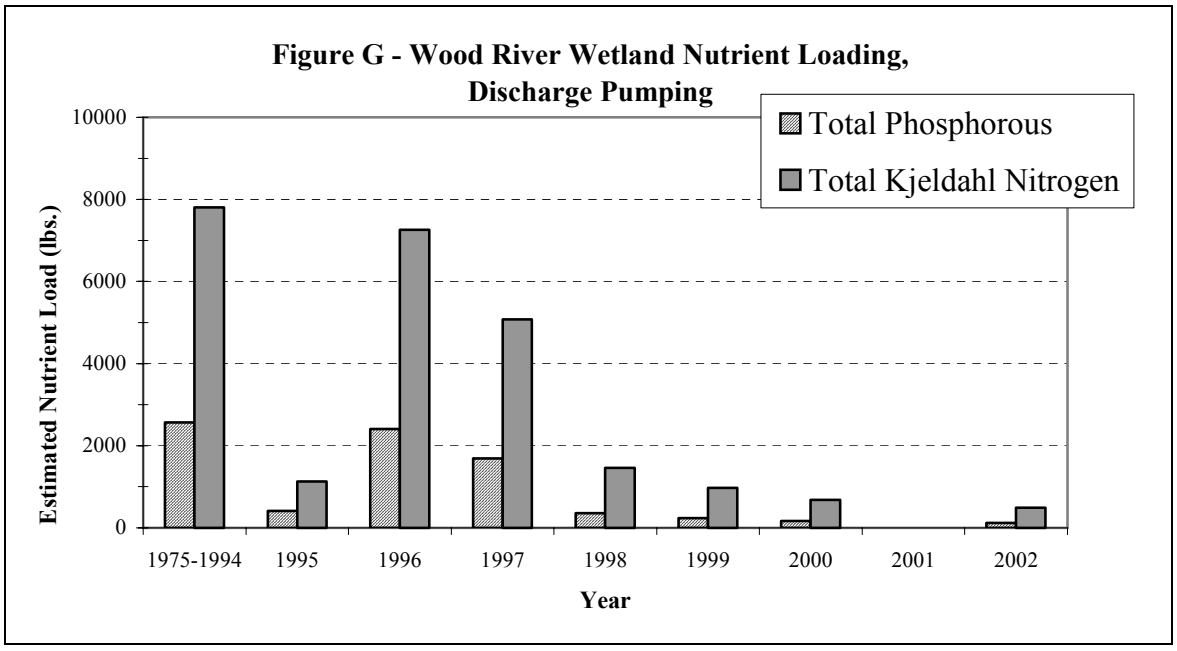


Figure G - Wood River Wetland Nutrient Loading,
Discharge Pumping
Total Phosphorous
Total Kjeldahl Nitrogen
10000
8000
6000
4000
2000
0
Estimated Nutrient Load (lbs.)
1975-1994
1995
1996
1997
1998
1999
2000
2001
2002
Year

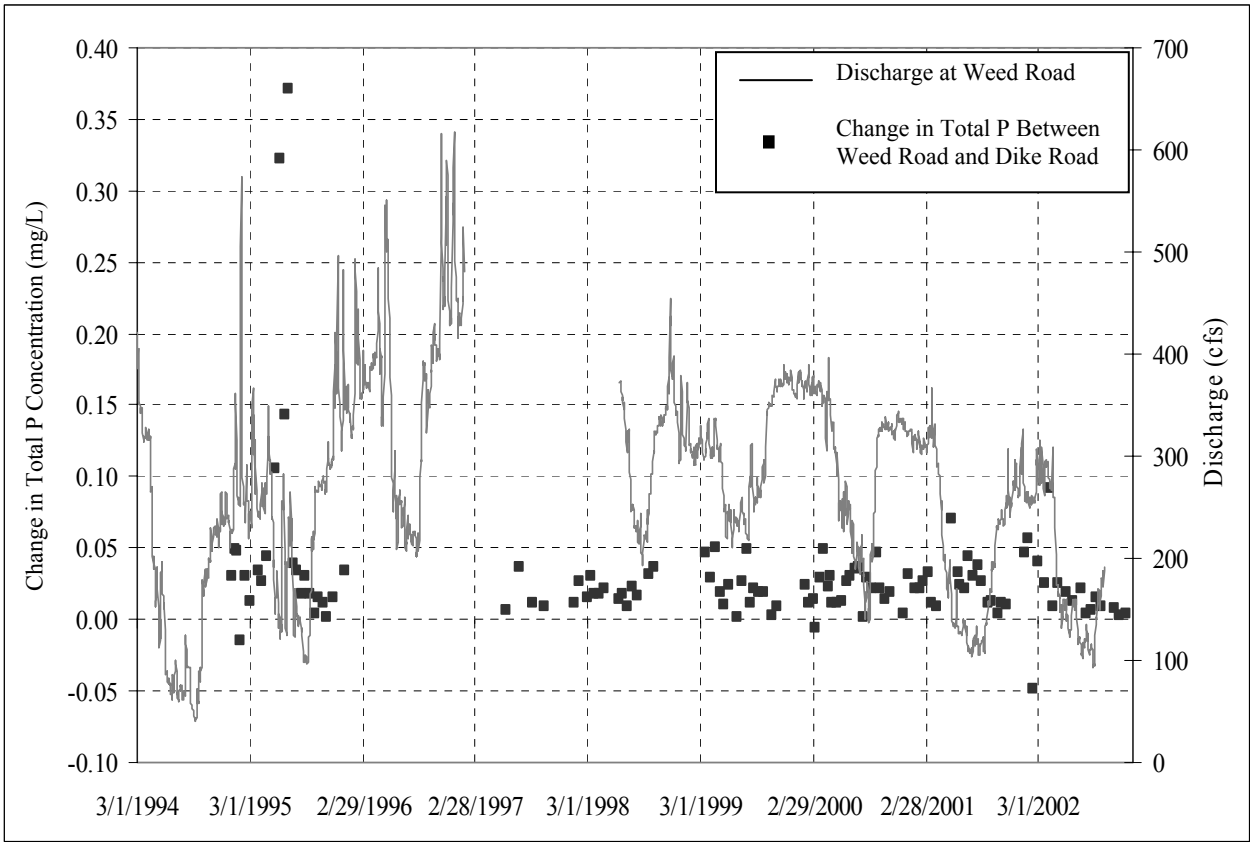


Figure I. Changes in total phosphorous concentration within the Wood River between Weed Road and Dike Road (positive values on the left axis indicate increased phosphorous concentration)(Klamath Tribes provisional data). Discharge measurements from the Weed Road gauging station are included for reference (right axis) (USBR and Graham Matthews & Associates data).

The Klamath Tribes have monitored water quality, including the concentration of organic and inorganic phosphorous ("total phosphorous', or "[TP]") in the Wood River at Weed Road and the Dike Road (among other sites) since 1995. Within the approximately 7-mile long stream segment between the two monitoring sites, there are numerous sources that contribute phosphorous to the Wood River. These include:

- Groundwater discharge areas, including artesian wells on the WRW that have [TP] ranging from 2.0 to 7.3 mg/L (Snyder and Morace 1997);
- Sporadic pump discharge from the Wood River Wetland, which occurs at a rate of about 20 cfs and has [TP] in the range of 0.9 mg/L (Snyder and Morace 1997; Rykbost and Charlton 2001);
- Crooked Creek, which flows into the Wood River at a seasonally varying rate of about 50 to 80 cfs and has [TP] on the order of 0.1 mg/L during late summer (Klamath Basin Rangeland Trust 2003; Kann and Walker 1999);
- Discharge from other reclaimed wetland areas adjacent to the Wood River (other than the WRW), which likely has [TP] in the range of 0.1 to 2.0 mg/L (Snyder and Morace 1997).

Water is diverted from this segment by the East Side Diversion and the WRW (the latter is rarely used).

Nutrient concentration measurements indicate that increases in [TP] between Weed Road and the Dike Road are typically less than 0.05 mg/L. The largest increases in [TP] were observed during 1995, a period with fairly low Wood River flows that coincided with prolonged pumping of the WRW. Although no data exists for the period prior to 1995, increases in [TP] during this period were likely high as a result of pumping from the Wood River Ranch. Because of the drainage system in place on the property, pumping draws water from soil pores, where it has been in contact with organic soils that are rich in phosphorous.

Since 1997, increases in [TP] have been lower. This is likely due, in part, to reduced pumping from the WRW. At present, pumping from the WRW occurs in spring for a limited time period. Pumped water with high [TP] enters the Wood River during the period when river flows are high, so the effect on [TP] in the river is dampened. During the summer of 2002, the apparent reduction in the magnitude of [TP] increases could be the result of reduced diversion rates and return flows associated with Klamath Basin Rangeland Trust activities.

FISH POPULATION MONITORING

- Interior wetland - Sampling of fish populations within the interior wetland. The objective is to gather baseline information on fish abundance and distribution as habitat changes over time.

- Wood River larval and juvenile out-migration - This included sampling with a shoreline-orientated trap net and fishing with drift nets and Fyke nets off the Dike Road Bridge. The objective is to gather baseline information on timing of early life stages and species presence of suckers and trout in the project area.

- Channel Construction Salvage - Data presented here includes capture data from efforts to collect fish that would be harmed from channel construction activities. The goal was to collect and move all fish before dredging and filling (except fathead minnows) and move them into un-impacted areas of the Wood River.

Interior Wetland: Gear deployed to sample fish presence within the interior marsh consisted a single ½ inch mesh trap net with a 100-foot lead extension. Traps were set for two nights each at two pond habitat sites between July 9, 1998 and August 6, 1998. The ponds were created from the removal of borrow material for dike building in 1996 and 1997. The ponds are located near the northeast corner the property and near the Wood River pump station. Shoreline vegetation at these sites is relatively sparse consisting mostly of recently colonized willow, *Potamogeton*, aquatic smartweed and scattered bullrush. Average and maximum depths are approximately three feet and five feet respectively. Little or no emergent vegetation was noted and bottom substrate was a mixture of peat and pumice sand. All of the fish sampled except the chub species are introduced species to the Klamath Basin.

1999 Fish Salvage

The construction sequence for the Wood River channel restoration work resulted in the flowing water to be contained within a channel that was designed to replicate the historic dimensions of the river (approximately 50' wide and 6'-8' deep). The restoration design called for the previously dredged channel to be filled to an elevation approximately the same as the original flood plain. Prior to the fill work beginning, the area to be filled was partitioned into segments, and fish remaining in these isolated segments were captured and returned to the river (salvaged). The following table displays the results of that salvage effort, and required 137 person hours to complete. During the salvage, backpack electro-fishing and dip nets were used to capture fish. Non-native fathead minnows were the most abundant fish present, and were not salvaged.

Table 10 Date	Redband Trout	Sucker sp.	Yellow Perch	Speckled Dace	Tui Chub	Blue Chub	Sculpin sp.	Lamprey sp.
7/27/99	1	1	1		4		14	2
7/29/99	2	6	2		55	20	6	
8/26/99	3	2	11	1	11		20	1
8/31/99	11	6	20		17	33	25	
9/1/99		35	52		236	112	9	1
9/7/99		123	165		250	198	36	1
9/8/99		54			369	280	15	1
9/9/99		17	24		102	124	2	
913/99	1	68	165		190	133	38	2
9/14/99		39	311	1	130	148	56	4
TOTAL	**18**	**351**	**751**	**2***	**1364**	**1048**	**221**	**12**

***** The numbers of speckled dace and other species (young of the year size classes) are under estimated, because fish that appeared to be fathead minnows during the electro-fishing, were not netted for salvage.

Fish Trapping

A technical team of experts in fisheries biology, geomorphology, and engineering has been meeting during the past two years to design and coordinate the river channel restoration project. The timing of the out-migration of young fish from the river to the lake was identified as information that would help minimize the short-term impacts of the construction work associated with work planned for the summer and fall of 2000. A rotating drum screw trap was obtained through the cooperation of U.S. Fish and Wildlife Service, U.S. Bureau of Reclamation, Oregon Department of Fish and Wildlife the Klamath Tribes and Oregon Trout. The trap was placed approximately one mile upstream from the entrance road bridge. Table 10 displays the results of running the trap

from August through December of 1999. Trapping efforts will continue over the next two years.

The screw trap was floated in the Wood River for all of 2000, however lake elevation and high debris load prevented operation of the trap a large portion of the year. The trap collected fish for 90 days. Operation during late spring and most of the summer was precluded due to lack of flow at trap site as a result of lake elevation. Most other days without fish capture were related to debris stopping trap operation and thus preventing trapping of fish.

Total number of fish captured in the trap was 2452 (Figure I). The dominant fish species captured was redband trout (*Onchorhynchus mykiss sp*.), accounting for nearly half (n=1134) of the total fish captured. At least thirteen fish species were captured in the trap; some sculpins and all lampreys were not identified past genus level.

Redband trout movement peaked on April 14, 2000, with 143 animals captured (Figure J). Based on the numbers collected from the trap, redband trout peak movements occurred in early March (peak number = 66), mid-April (peak number = 143), and middle to late September (peak number = 88).

One shortnose sucker (*Chasmistes brevirostris*) was captured during FY 2000 operations. Lip morphology clearly indicated positive shortnose identification. Length of the shortnose sucker was 87 millimeters. No other suckers were captured in 2000.

Pulses of increased crayfish and lamprey capture were noted FY 2000 (Figure I). From mid-September to the end of October 1,834 crayfish were captured in the trap. This accounted for 87% of the crayfish capture FY 2000. Lamprey pulses were also noted to occur during trapping operations. The peak migration of 78 lampreys was captured on October 21, 2000. Average capture rate for lampreys across all days of fish capture was slightly more than 4 animals per day.

The peak numbers captured often accounted for a relatively large percent of total fish captured. Therefore, missing or hitting the peaks, due to debris or lack of flow, could result in a large sample error.

Comparisons between 1999 and 2000

The Wood River screw trap was installed and began operating in September of 1999. Data on fish movement in spring is not available for 1999. For comparative purposes data comparisons between FY 2000 and FY 1999 will be limited to fall operations, September 24 through December 31.

The Wood River screw trap collected fish for twenty more days in 2000 than 1999 (30 days in 1999, 50 days in 2000). High debris loads halted trap operation for parts of the analysis period in both years. Total number of fish captured in 2000 increased four fold from 1999 numbers (Figure I). Capture numbers of all species (except for sculpin,

yellow perch, and suckers) increased at least two fold in 2000. Sculpin capture increased in 2000, but only by 16 animals. Yellow perch captures were very low, FY2000 n=5 and FY 1999 n=4. Sucker numbers did not increase in 2000, for both years numbers were very low, FY 2000 n=1 and FY 1999 n=3.

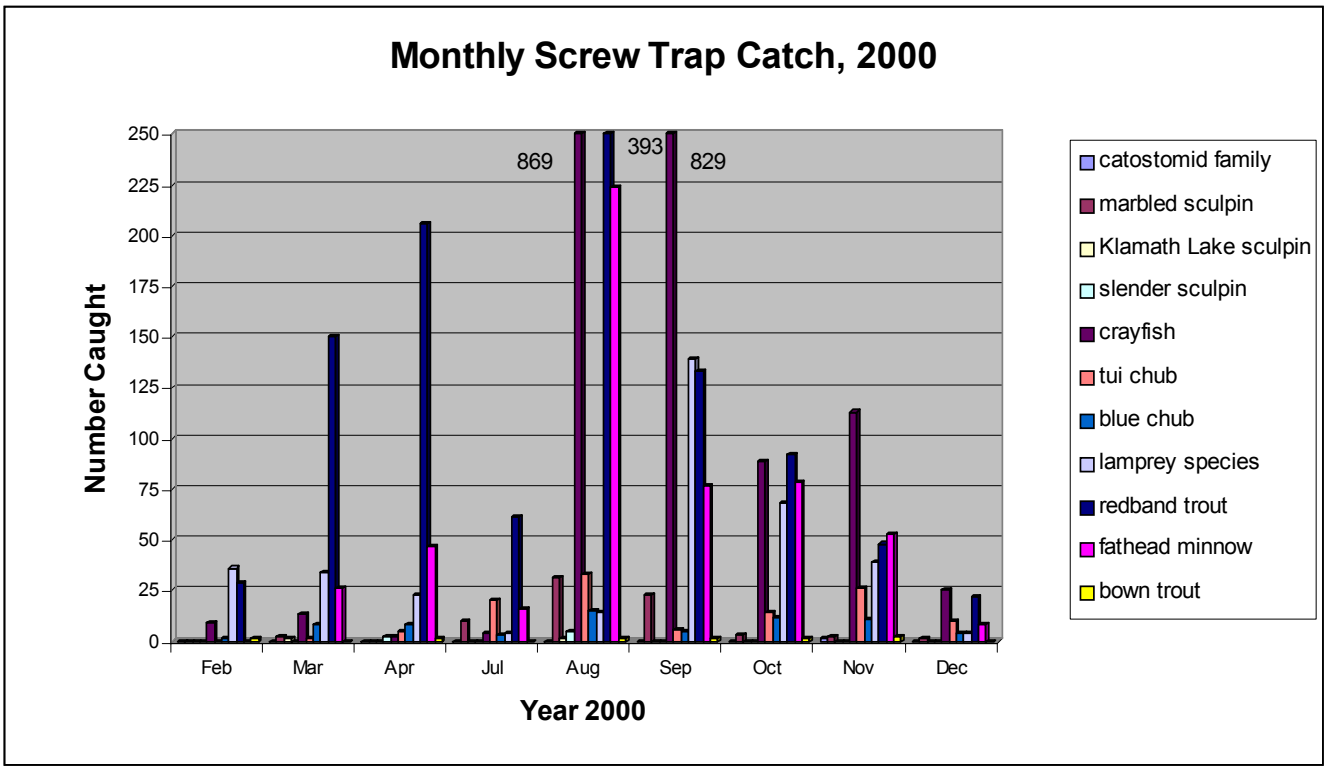


Figure J: Total monthly catch by species for the Year 2000

[1] Data entry for 2000 screw trap data has not been verified by visual check of entered data as of 2/27/01. Therefore data summaries may be subject to change upon verification of screw trap data.

Increases in fish capture, between 1999 and 2000, are potentially related to improved channel characteristics as a result of channel scour and vegetative recovery along the river bank. The process of channel scour and bank vegetation recovery concentrated flow into a more confined channel when water elevation was below bankfull. Increased stream flow and a confined channel width would increased trap efficiency by turning the screw faster and increase the percentage of the water column sampled.

Better efficiencies could explain the increase in numbers. However other biological, as well as environmental, variables between years could also account for the increase. Increases in spawner recruitment from 1999 to 2000 could increase total numbers captured in the screw trap. Comparing ODFW spawning surveys and screw trap fish captures are recommended in the future

Species list of fish captured in Wood River screw trap for year 2000, including *scientific name* and common name.

Chasmistes brevirostris, shortnose sucker
Cottus klamathensis, marbled sculpin
Cottus princeps, Klamath Lake sculpin
Cottus spp., sculpin species
Cottus tenius, slender sculpin
Gila bicolor spp., tui chub
Gila coerulea, blue chub
Lampetra spp., lamprey species
Lepomis gibbosus, Pumpkinseed
Onchorhynchus mykiss spp., redband trout
Perca flavescens, yellow perch
Pimephales promelas, fathead minnow
Rhinichthys osculus, speckled dace
Salmo trutta, brown trout

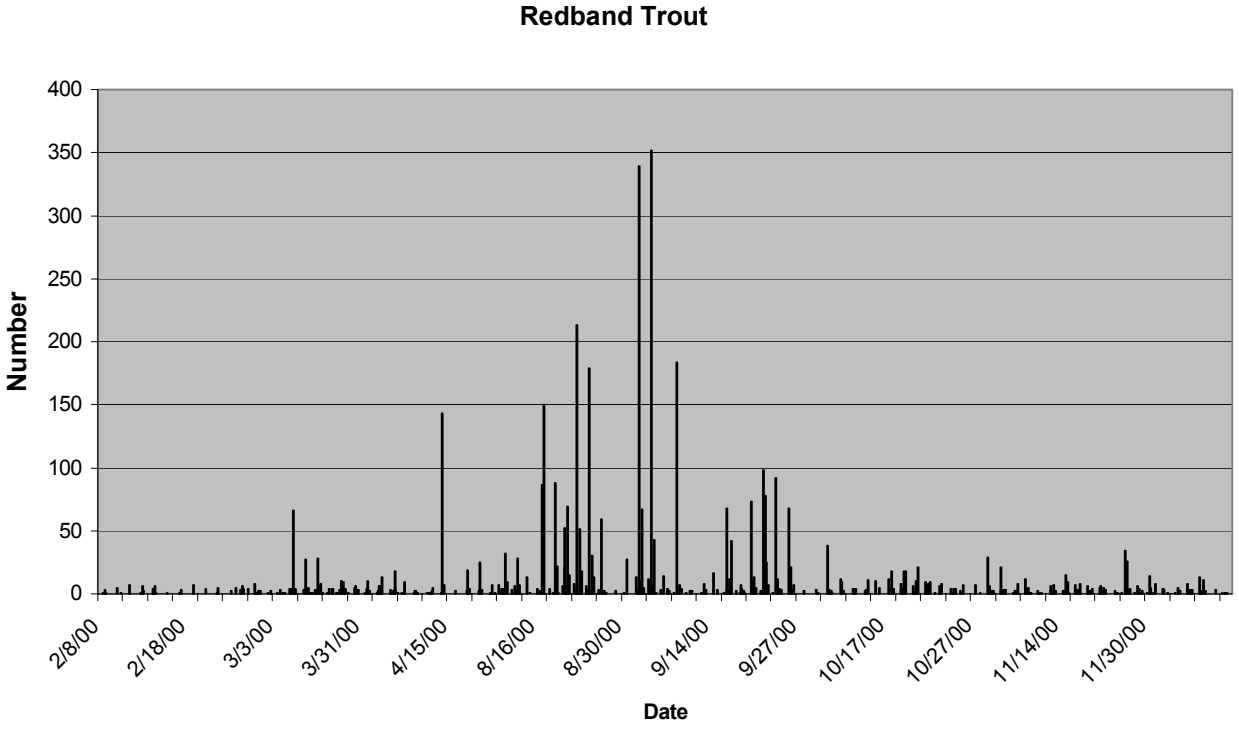


Figure K: Daily redband trout catch, 2000.

SPOTTED FROG POPULATIONS

Oregon Spotted Frog Egg Mass Survey

Methods

Egg masses were enumerated using a visual encounter survey technique at the breeding site (Crump and Scott 1994) with a minimum of two visits to ensure a complete egg count (Thoms et al. 1997). Linear aquatic habitats (ditches, streams) and large, contiguous aquatic habitats (marshes, ponds) were surveyed by slowly walking along the edge of the aquatic habitat, enumerating egg masses and documenting locations with correctable Rockwell Plugger and Trimble GeoExplorer GPS units and a datasheet (modified "Corn" form; Olson et al. 1997).

Results

This preliminary survey is not intended to be a comprehensive, detailed survey of the entire Wood River Wetland. Habitats were searched on 12 and 13 April 2002. Water and air temperatures were determined with a pocket thermometer. An egg mass site is defined as a site with at least one egg mass that is at least 4 m from another egg mass. Egg masses were recorded at 12 sites along the Wood River Ditch, a small parallel ditch and 1 site in the northeast pond (Figure L). Egg mass numbers ranged from 1 to 26 egg masses per site. A total of 88 egg masses were enumerated within the Wood River Ditch and adjoining sites.

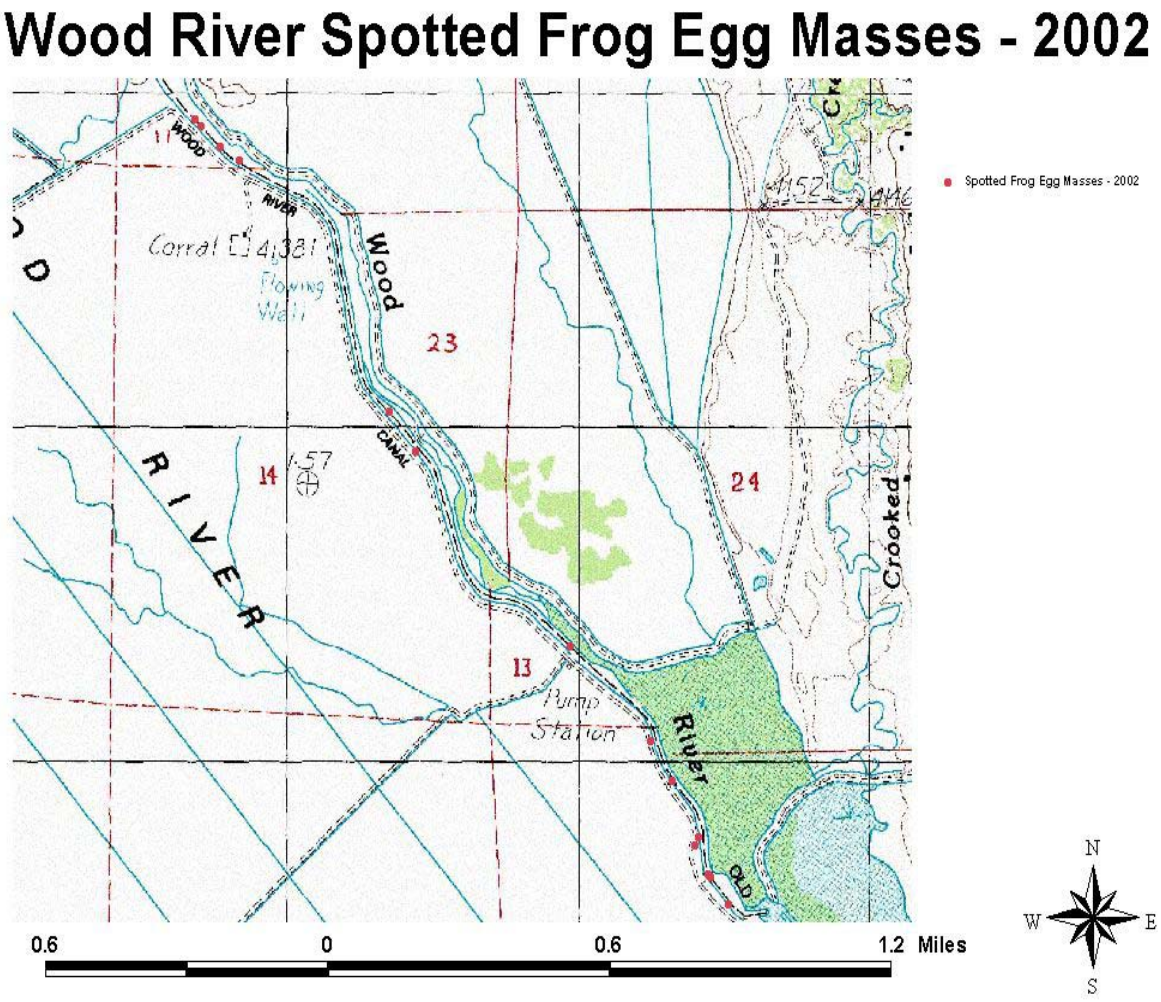


Figure L: Oregon Spotted Frog Egg Mass Survey

RECREATION

Visitation Monitoring

The KFRA conducted both informal and formal efforts to monitor visitation and recreation use in 2002. Employees working on site at Wood River observed the number and type of visitors and vehicles parked in the lot, and talked with visitors to learn more about their interest in the wetland and satisfaction with their visit. Employees also fielded questions, complaints and comments about WRW at the BLM office.

Informal monitoring took place by employees working onsite by observing visitation, talking with visitors, during outreach efforts, and by noting the number of vehicles in the

parking area. General conclusions from this monitoring indicate that visitor use of the wetland is slowly increasing, occurs during every month of the year and on most days of the year, and that the wetland is used both as a destination for out of area visitors, and as a nearby park area for local residents.

Visitation was formally monitored by means of a visitor registration box at the entrance area and by doing personal observation visitor counts. The registration form asks visitors to record the number of hours spent at various activities, their home zip code, the number in their group, and has room for comments and suggestions.

Table 11 distribution of use by activity type.

2002- Wood River Use by Activity (hours per month)									
Month	**Activity**								
	Wildlife Viewing	Hiking	Non-Motorized Boating	Waterfowl Hunting	Other		Total Hours		
April	7	12		***	5		24		
May	19	2		***	1		22		
June	10	4	14	***	7		35		
July	9	8		***	19		36		
August	32	8	3	***	17		60		
September	16	7		6	4		34		
October	20	9		48	7		84		
Total Hours/ Percentage of total	113/ 39%	50/ 17%	17/ 6%	54/ 18%	60/ 20%				

***Months when hunting season is closed

Because visitor registration was voluntary and unobserved for the most part, the rate of registration by various user groups is unknown, and therefore any results or conclusions must be interpreted very generally.

Some of the activities listed above as “other” include mountain biking, picnicking, and fishing. The wetland appears to be used for a diversity of recreational activities, with wildlife viewing appearing to be the most popular. Management efforts should continue to focus on those recreational opportunities that are most popular and suitable for the area.

Many comments were received on the registration forms; they were generally favorable and appreciative of the work done to the area and the recreational facilities provided. Visitors were concerned about future maintenance to the wetland, the amount of water they saw or didn’t see on the wetland and its impact to basin agriculture or hunting

conditions, litter they saw while visiting, and some requested more trash cans and more frequent trash pickup.

Visitation was also monitored in 2002 using personal observation counts. Observation periods were randomly selected and an observer was posted in the entrance area to record various characteristics of visitation. Figure M shows an example of the recording form.

Figure M Wood River Wetland Visitor Count Form….

Wood River Rec. Survey	Date	Time	Area in Use Dock/Trail	Party Size	License. Plate (State)	Rec. Activity	Duration of visit
(Cont'd)							

Visitor counts were done on 10 dates during the July-October period for periods ranging from 4 to 8 hours. Table 12 gives a summary of the direct observation monitoring effort.

Table 12 Visitation Monitoring by Direct Observation—Summary

Date-Day of the week	Observation Period	Number of Groups	Total number of visitors	Average length of visit	Comments
7/14-Sunday	6-10 am	5	9	66 min.	
7/28-Sunday	11am-6pm	8	14	55 min.	1 Nevada license plate
8/7-Wed.	6am-1pm	8	17	97 min.	
8/19-Mon.	11am-5pm	1	1	60 min.	Smoky, hazy day from wildfires
8/22-Thurs.	10am-4pm	4	6	50 min.	
8/23-Friday	10am-4pm	4	12	48 min.	
8/25-Sunday	2pm-8pm	8	14	58 min.	Moderate smoke haze
9/1-Sunday	6:30am-12:30 pm	6	11	50 min.	
9/7-Saturday	6am-12pm	8	19	263 min.	Opening day of early Goose hunt
10/5—Saturday	4am-12pm	36	78	Estimate 180-240 min.	Opening day of general waterfowl hunting season

The visitor count data were used to refine the estimate of annual visitation to the wetland. For 2002, annual use is estimated at 6000 visitors. The vast majority of recorded visitors are Oregon residents; however visits from other states, especially California and Washington, were recorded. Visitation to the wetland appears to be equally split between weekend and weekday use, and occurs in most if not all months of the year.

Future monitoring work of recreation visitation should include periods of direct observation of the visitors to establish a compliance/use rate of the registration box. The registration form may also be periodically revised to better capture information or gather other visitor information.

Outreach/Environmental Education Activity

A variety of outreach activities occurred at Wood River Wetland in 2002. A total of 16 events (presentations, classes and tours) took place and 510 people participated. A variety of groups, from a first grade class (Chiloquin Elementary) to the National Academy of Sciences participated. In September the BLM Klamath Falls Resource Area held its third annual National Public Lands Day event at the wetland. A group of about 70 volunteers spent the day planting trees and shrubs, maintaining trails, installing canal crossings, staining picnic tables and benches, and building and installing bird nest boxes.

Volunteer Work

A local group (The Usual Suspects) has adopted Wood River Wetland, and maintains the parking lot, bathroom and canoe launch facilities. Oregon Institute of Technology students continue to provide information on a variety of parameters as they complete sophomore and senior projects for the Applied Environmental Science major.

Recreation Projects

Repair work was done to canal crossings that hunters use to access the wetland interior. Two additional floating canal crossings were installed. A new precast concrete double vault toilet was installed at the 3-way road intersection on the southeast corner of the wetland.

VISUAL RESOURCES

The Wood River channel restoration project was completed at the end of year 2000. The area next to the river that were re-vegetated in 1999 have recovered rapidly as willows, cattails and other vegetation become established. The wetland area continues to show significant improvement in scenic quality and is more naturally appearing now that the native vegetation is becoming established. It is expected that these improvements in scenic quality will continue as additional areas along the river are re-vegetated and the disturbed areas show recovery.

LANDS

Land Sales

When Congress instructed the Bureau of Land Management (BLM) to purchase the Wood River property, it also instructed the BLM to dispose of public lands in Klamath County to offset losses in property tax revenue that could occur from the acquisition. In 1998 the Klamath Falls Resource Area sold 1,600 acres of public land to the American Land Conservancy for the appraised fair market value of $625,400.00. The American Land Conservancy subsequently sold the property to the Jeld-Wen Corporation. In 2001, an additional 80 acres was sold for $10,000.00. In 2002 another 200.12 acres was sold for $23,900.00. The mineral estate, except for the oil, gas and geothermal resources, was conveyed in all sales.

Lands Actions in Support of Restoration

Land surveys by the BLM Cadastral Surveyors were programmed for the summer of 1999. The surveys will identify small slivers private lands that need to be acquired to facilitate the completion of phase 3 of the Wood River channel restoration. Difficulties in the timing of construction work and the availability of the Cadastral Surveyors have delayed the survey until the 2002 field season. The survey is being completed under contract with a local surveyor. BLM has received preliminary drawings and legal descriptions. The adequacy of the drawings and legal descriptions is being currently reviewed in the state office.

GRAZING

The BLM is currently in the process of assessing all grazing allotments to ascertain if current grazing use is meeting the 5 Standards for Rangeland Health and meeting the Guidelines for grazing management (S&G's). This process is required by the grazing regulations resulting from the Bureau's "Healthy Rangelands" initiative (aka "Rangeland Reform '94"). An S&G assessment analyses existing information (i.e. rangeland monitoring studies or surveys, riparian studies, etc.) to characterize the general health of a grazing allotment within the framework of the 5 Standards for Rangeland Health. The 5 Standards are summarized as follows: Standard 1 - Watershed Function - Uplands; Standard 2 - Watershed Function - Riparian/Wetland Areas; Standard 3 - Ecological Processes; Standard 4 - Water Quality; and Standard 5 - Native, T&E, and Locally Important Species. The S&G's assessments identify if the Standards are being met and if not, the significant factors contributing to failure to meet Standards. The S&G's process is, by policy, currently directed at only livestock grazing.

The Wood River ROD/RMP states that "If and where appropriate, use livestock grazing as a vegetation management tool to support the primary goal of wetland restoration." Since 1994, livestock use has been considered incompatible with the ongoing wetland restoration activities and is expected to continue to be considered such in the foreseeable future. However, since the Wood River property is still a potential grazing allotment -

and grazing could be used as a management tool - an S&G's assessment was scheduled and completed in FY00. Since no licensed grazing use has been authorized on the property since November 1994, livestock were not considered to be a factor in the current attainment or nonattainment of any of the 5 Standards. A copy of the Wood River property S&G's assessment is posted on the Klamath Falls R.A. website or is available upon request. (Wood River S&G's Assessment is available at following URL: **http://www.or.blm.gov/Lakeview/kfra/whatwedo/Range/Rangeland_Health/Assessment_WoodRiver.pdf** and must be viewed in Adobe Acrobat.)

CULTURAL RESOURCE MANAGEMENT

The KFRA BLM Cultural Resources Program continued to provide support for restoration activities conducted at the Wood River Wetlands during 2002. Activities largely concentrated on ensuring that restoration activities did not affect archaeological and historical sites.

The National Historic Preservation Act, in addition to other laws and regulations, requires that potential impacts to cultural resources be addressed prior to and during the implementation of construction. Cultural resource surveys had been conducted along and near the Wood River prior to river restoration construction. Though no cultural resources were located during these surveys, four archaeological sites were encountered during phase I and II construction in 1998. Construction impacts were minimized at all four of these cultural sites.

Two projects were proposed in the Wood River Wetlands during 2002 that required cultural resource investigation. These projects included installation of a fish screen at Seven Mile Canal and installation of a vault toilet adjacent to the Agency dike bridge. Other projects within the Wood River Wetlands did not require cultural resource fieldwork. Two projects involving routine levee maintenance consisted of office record searches only.

Cultural Resource surveys in the area proposed for the Seven Mile Canal fish screen had been conducted in 1995. No sites were identified in this area during that survey. However, the potential for buried archaeological sites in this area was considered to be fairly high so construction activities were monitored. No cultural resources were encountered during installation of the fish screen.

A cultural resource survey was conducted in support of the installation of a vault toilet located just west of the Agency dike bridge. No cultural resources were discovered during this survey. However, because archaeological sites were known to exist in the vicinity, recommendations were made for monitoring construction activities during installation (scheduled for FY03).

The Klamath Tribes have been active participants throughout this entire process. A Memorandum of Agreement between the Klamath Tribes and Oregon Trout had been

previously signed which provided for monitoring support and the protection of cultural sites. Extensive monitoring by Klamath tribal members was conducted in 1998 and continued through 2000. Regular bi-monthly consultation meetings with the Tribes have been held through 2002 and will continue to be held. Each of the construction projects discussed above was presented to the Tribes at one of the bi-monthly meetings. During these meetings the Klamath Tribes agreed with our recommendations for construction monitoring.

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